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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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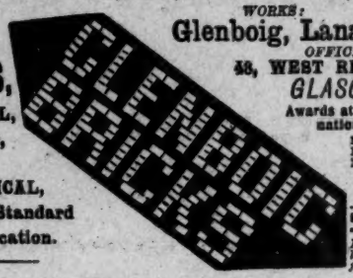

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VOL. CXXXIX., No. 2830.] TUESDAY, AUGUST 7, 1917. [69TH YEAR.

EDITORIAL NOTES.

More Tar an Urgent Need.

TAR is the urgent requirement of the day. Comment was made last week upon the appeal of the Ministry of Munitions to gas engineers to apply themselves to realizing the maximum coal-gas output, and to shut-down their water-gas plants at once, except in so far as their use is necessary for meeting any excess demand for gas beyond the capacity of the retort-settings. It was also then mentioned that the Coal Controller had promised to see that gas undertakings were amply supplied with coal. The Ministry of Munitions require the maximum production of tar, of as good quality as possible. We cannot understand why this order has not come earlier, inasmuch as it is obvious that the home production of every conceivable material contained in coal is most necessary to the country in time of war. The National Gas Council have been approached by the Ministry of Munitions in regard to the matter; and the Executive Committee (with a number of gas engineers and managers who have been co-opted to form a Consultative Committee) are to work in conjunction with the Ministry in connection with it. Two suggestions are put forward: (1) The one already referred to, of shutting-down all water-gas making plants save for meeting demands in excess of coal-gas capacity; and (2) to increase the yield of tar by a suitable reduction in the temperatures at which the coal is carbonized. There are numerous difficulties to be encountered; but it is hoped that all undertakings will consider how best to augment their output of tar. Already the days are gradually drawing-in; and every day brings us nearer winter, when retort temperatures will again have to be raised in many cases and the maximum production secured from every ton of coal handled.

Board of Fuel Research Inquiry.

THE preliminaries are under way with regard to the preparation of material and evidence to be submitted to the Board of Fuel Research in connection with the inquiry to be held by them as to the composition of town gas. A report is being prepared for the Board by the Institution of Gas Engineers, who are acting in the matter in collaboration with the National Gas Council. It is understood that every section of the gas industry will be consulted before the report referred to is presented; it being appreciated that not only the manufacturing but the consumers' side of the subject should be considered. From a paragraph that appeared in the "JOURNAL" last week [p. 210], it will be gathered that local authority associations are also being consulted; and it may be presumed that large consumers—such as the railway companies—will likewise be invited to give evidence. Any way, from what is already known as to the steps that are being taken by the Board, it is clear that the inquiry will extend to all the interests concerned.

Ratio of Bye-Products Output to Gas Make.

BY the reference made to the Fuel Research Board by the Board of Trade and other Government Departments concerned, as to the most suitable quality of town gas to be generally supplied, they are very properly requested, among other considerations, to have regard to the adequate recovery of bye-products. The secondary products of coal carbonization are an important element in the economy of the gas industry, and therefore in the fixing of the price at which undertakings are able to put gas at the service of users. This being so, the "adequacy" of the recovery of bye-products is only part of the question. Consideration should extend to the commercial position of each individual product—not only under current conditions and not in relation to past circumstances, but with a view to prospective conditions, some of which have been hurried into great prominence by the requirements of the war or forced by the war, not only at home, but in Germany and other countries. Aligned with this prospective position is the matter of the economical development of the secondary products business within the industry; and in this connection there may be earnestly commended to the Fuel Research Board the decision of the Joint Committee of both Houses of Parliament in the session of 1912 [see "JOURNAL" for Dec. 17, 1912, and the Blue Book issued in 1913] regarding freedom in the working-up of secondary products, and the subsequent abuse of the recommendation, at the instance of the chemical manufacturers, by certain Parliamentary Committees and the Private Bill Authorities.

The work of the Fuel Research Board is directed mainly to the question of fuel economy; and fuel economy must take into consideration the best utilization not only of coal but of coke, with the view of conserving the former. This has a bearing upon the point it is desired to make regarding secondary products. It is certain that there will be after the war a greatly increased use of gas, and that this will enlarge the yield of the secondary products. It becomes a question therefore whether, in view of the prospects of the bye-products markets, it will not be better, in the cause of an ultimate economy, to go as far as is practically and reasonably possible in producing, by the carbonization of coal and the gasification of coke, a mixed gas of approxmately the composition that may be resolved upon, and so to that extent reduce the ratio of the output of secondary products to gas. It is not intended here to make any categorical pronouncement on the subject, but merely to put forward the point as one that should be considered as being important in the determination of the general question. It is, however, perfectly obvious that, although the Fuel Research Board may—quite apart from the inquiry in which we are more immediately concerned—eventually make recommendations which will help to prevent the present wasteful use of bituminous coal, and bring gas and coke into much more extensive use, there can be no acceptance of the frequently uttered generalizations as to the complete prohibition of the use of such coal, as the economical supply of gas and coke is in part governed by the points at which the supply of the whole of the secondary products is counterbalanced by the demand, and paying values are maintained.

Take in the first place coke. Through the shortage of supplies of coal due to distribution difficulties, coke has been having a good time; and there is not the slightest doubt that the extensive use that has been made of it during the war for steam-raising, and to a smaller extent for steam-driven road vehicles, will ensure a considerably larger demand in the future than was the case before the war, when disheartening accumulations of coke were seen in many gas-works yards. The prescription of a gas which would permit of the more general use of a percentage of blue water gas or lightly carburetted water gas would, at the same time, do something to reduce not only the output of coke in relation to gas made, but would absorb a proportion of that produced. It is admitted that the thermal efficiency of coke gasification does not nearly approach that of coal carbonization. Taking the thermal value of a good coke as 14,000 B.Th.U. per lb., this would be equal to 31,360,000 B.Th.U. per ton; gasifying the ton, and realizing (say) 60,000 c.ft. of 300 B.Th.U. gas, is equal to 18,000,000 B.Th.U, or about

57 p.ct. of the heat value of the coke. Yet there are economic advantages which fully justify the thermal expenditure. Of course, the prohibition of the use of bituminous coal for (say) steam-raising and industrial purposes would—if generally feasible—at once provide a certain market in industrial centres for large outputs of coke. But it is not all areas that are well-favoured with fuel-consuming industries. The saturation point for the domestic consumption of coke would soon be reached, as in the household choice between gas and coke for cooking and heating would—excepting in large establishments for hot-water supply—generally result in gas receiving the preference. Prohibition of the use of bituminous coal for domestic purposes has not yet been brought within the range of practical politics. The possibility may grow with the economic development of the gas industry; but the time is not yet. Nothing definite can at present be said as to low-temperature carbonization; but the prospects dwindle the more it is investigated from both the technical and the commercial points of view. The fact that the systems are approaching the higher temperatures employed in the gas industry speaks volumes.

Regarding the other bye-products, the sources of supply are not confined to the gas industry. With the development of the trade of this country, the demand for metallurgical coke will grow; the beehive ovens are threatened with extinction; and the bye-product recovery ones are bound anyway to be considerably extended, with the result that the productions of tar, benzol, and sulphate of ammonia will be largely supplemented. Possibly in relation to tar and sulphate there are reasons for endeavouring to reduce the ratio of their output to the expected future larger output of gas by gasifying coke to the extent that prudence permits, while seeing to it that the tar and sulphate made are not sacrificed in any way in quality or quantity in relation to the quality and quantity of the coal carbonized. There is an enormous field for all the products of tar. But we must look for a considerable increase in its production with the hoped-for expansion of the use of gas, and the greater requirement of metallurgical coke; for although we speak of the ratio of the output of secondary products to the output of gas being lowered, this does not mean that, with the expansion of gas consumption, the quantity of coal carbonized is not going to grow considerably. For dehydrated tar, there is a limit to demand for road and other purposes. For pitch there are bounds to its service, and the development of its home use for briquette making is not greatly encouraged—in fact, it is recognized that commercial success is largely governed by the price of other fuels. Anyway, though the industry is allowed, by the more general gasification of coke, to produce a mixed gas of excellent combustible character, and giving a high flame temperature, there will be no lack of tar (we are speaking of after the war) for all requirements. Then there is sulphate of ammonia. In now being through the war well disposed of at home, it is in an unprecedented condition. After the war, its output will certainly increase. But both at home and in the markets abroad, where the greater part of the British output formerly found custom, it will, on the return of peace, be subjected to heavy competition from other fertilizers, including those which depend upon the utilization of atmospheric nitrogen. The war has been a compelling force. Japan, America, Russia, and other countries have, owing to it, been developing their output of sulphate of ammonia and other fertilizers. Plants for the fixation of atmospheric nitrogen have been or are being established not only in this country and America but in other countries; and in the countries where such plants existed before the war there has been large supplement of output capacity. Germany to-day affords a lesson of what can be done in the home provision of all the nitrogen required for both explosives and agricultural needs. We have to accept the fact that sulphate of ammonia is in for stern competition. What the ultimate effect on market values will be will depend upon the relative costs of production, and the selling prices per unit of nitrogen, of its competitors.

The most promising development for the gas industry lies in the extraction of benzol. There is no need to anticipate over-production; and there is likely to be great competition for the production. The dye makers are anxious to protect their future in regard to it; the use of motor cars will develop enormously. Always benzol will be able to command a price at any rate following close to, if not equal to, that of petrol. What may be lost upon sulphate of ammonia profits should be largely compensated and more by benzol. Assuming a make of 28 lbs. of sulphate per ton of coal and the price of £15 per ton (which the most sanguine do not expect after the war) this is a revenue of 3s. 9d. per ton of coal, less working expenses. A production of two gallons of benzol per ton of coal should give a profit that will more than counterbalance any depreciation of profit under normal conditions on sulphate of ammonia through new competition.

From these considerations, it will be seen that the ratio of secondary product output to gas output is a point for inclusion in the discussion of the question of the composition and materials to be used for gas production, having regard to the prospect of a large growth in demand. Another point is that for the preservation of the efficiency of the country in national defence, and for the welfare of industries depending upon the products of coal carbonization, the development of the gas industry on the best lines, consistent with modern progress, must not be tampered with in any way, but must be given every opportunity for expansion. The pre-war position in regard to coke and tar, and the post-war position of sulphate of ammonia, demand that the benzol recovery work which has been promoted in the industry for war purposes, and which has necessitated large plants being erected, should be developed in the economic interests not only of the industry but of the country; and as it is an obvious economy that the secondary products should be treated as near as possible to the place of their production, it should be within the power of all large gas undertakings, or local groups of the smaller undertakings, to co-operatively carry on tar distillation and oil-debenzolizing work to the utmost extent. A technically composed Board appointed to deal with questions concerning fuel economy will wonder why economy has encountered obstructionists to such developments.

Nitrate of Ammonia.

Before the Society of Chemical Industry and the Midland Section of the Coke-Oven Managers' Association, Mr. E. Kilburn Scott has lately been advocating the conversion of the ammonia recovered in coal carbonization into nitrate of ammonia (instead of sulphate of ammonia) by means of nitric acid produced by the fixation of nitrogen from the atmosphere by electrical power; and he makes out an excellent case on paper, with the working figures well on the low side, and the probable profits represented as being on the high scale. Naturally, with the threatened after-war avalanche of fertilizers through the use of nitrogen derived from the atmosphere, and extended production from existing sources, carbonizers of coal are most desirous of knowing all about processes which offer them a more profitable utilization of their ammonia. The question is whether Mr. Kilburn Scott has really offered them anything that is commercially better. He more particularly addresses coke-oven managers; but he appears to have overlooked the fact that gas undertakings have hitherto been the largest producers of sulphate of ammonia, and are still about on an equality with bye-product coke-ovens, despite the increased amount of work at these during the war.

However, Mr. Scott probably addresses the coke-oven industry, in view of the gas and the waste heat that it has for disposal for the development of the electrical power with which he contemplates producing the nitric acid. In other words, he proposes the manufacture of nitrate of ammonia with "home-made" nitric acid, instead of making sulphate with purchased sulphuric acid. Relative production costs of the finished article, and relative selling values per unit of nitrogen, must determine the line of manufacture to follow. Perhaps Mr. Scott is unaware that trials are proceeding with the manufacture of nitric acid direct from coal gas and producer and low-grade gases, by explosion [*ante*, p. 21]; the experiments so far suggesting that, by employing coke-oven gas, about 6¼ lbs. of acid per 1000 cubic feet of gas exploded must be looked upon as the maximum. The plant and process appear simple enough. But more information is required for comparison purposes. However, Mr. Scott must know that for war purposes the sulphuric acid production capacity of this country has been considerably enlarged, with the result that the sulphuric acid makers are already anticipating a difficulty in maintaining their pre-war rate of profits when the war demand ceases. Moreover, there are gas-works that, utilizing the sulphur derived from the purification of their gas, have been making sulphuric acid cheaper than they could purchase on the market; and the

same course of procedure has been advocated in connection with the coke-oven industry. As a matter of fact, in order to utilize coke-oven gas in gas-engines for the generation of the electrical energy required for the production of the nitric acid, the gas would have to undergo oxide purification (which is quite a cheap process), and the sulphur be recovered. There is no reason, therefore, why the choice should not be between home-made nitric acid and home-made sulphuric acid. A further consideration is found in a paper read recently before the London Section of the Society of Chemical Industry by Mr. H. M. Ridge, who held out the hope of a considerable cheapening of sulphuric acid by the utilization of the sulphur contents of zinc ore. A notable paragraph in the paper is this:

> In 1913, our consumption of spelter amounted to no less than 224,000 tons, of which 74 p.ct. was imported. After allowing for the metal made by the refiners, we imported about 166,000 tons of spelter and zinc in other forms. If this quantity were all made from blende, the roasting fumes could be used to produce annually 400,000 tons of 140° Tw. acid. There is no reason why this should not be done, and the corresponding quantity of brimstone and non-cupreous pyrites displaced as well as a portion of the pyrites which is low in copper. Before the war, the cost of making 140° Tw. acid from zinc ore fumes in this country was only between 8s. and 9s. per ton; so that the operation is remunerative and profitable.

The price of sulphuric acid has a very large bearing upon the future of sulphate of ammonia made from the ammonia resulting from coal carbonization.

But let us turn from these pertinent considerations to the financial ones. For a 1000 KW. gas-driven electric generating plant, Mr. Scott estimates the goodly capital outlay of £28,000, or for one utilizing waste heat for providing steam £29,000. He calculates that either of these plants would produce electrical energy which, sold to the process at ⅛d. per unit, would on an 8000-hour use per year produce a revenue of £4166. Such use means practically continuous running. The £4166, it seems to us, has to stand a big strain—capital, wear and tear (which would not be light) and renewal charges, labour, and stores, and what is left the coke oven owner is welcome to for his gas. As the gas has obviously some value for other purposes, the coke-oven owner would be foolish not to wish to take credit for its fair value. If he does this, the ⅛d. per unit will find itself under these conditions ruled-out of existence before the coke-oven owner is properly satisfied, and it would probably pay him better to sell the gas to the gas industry. It is, however, upon the ⅛d. that so much depends in the cost fabric that Mr. Scott has constructed, and which from the designed plant gives him 1500 tons of 33 p.ct. nitric acid at £4 10s. per ton, which, with 125 tons of pure ammonia at £30 per ton, produces (by the employment of electro-chemical plant costing £8000 upon the expenditure on power plant) 635 tons of nitrate of ammonia at £16 10s. per ton.

There is a good deal that is speculative in the case Mr. Scott puts forward. He tells us that before the war nitrate of ammonia made by the electric process in Norway was selling in large quantities at £28 to £30 per ton. He thinks what has been will be. "The price per unit of contained "nitrogen will be higher for nitrate of ammonia than for "any other nitrogen compound. This has always been so, "because the combined nitrogen is 35 p.ct." Sulphate of ammonia producers are cognizant of certain things in this connection. The world's production of artificial fertilizers is going to be much greater after the war than before; and nitrate of ammonia among the rest will be subject to this greater competition. Moreover, sulphate of ammonia has in the past received a price per ton which has worked out to a smaller value per unit of nitrogen than lower priced nitrogenous fertilizers. Experience teaches us that farmers look at the price per ton as well as at the nitrogen value; and nitrate of ammonia is not going to alter this agricultural idiosyncrasy. The farmer will want to know why he should pay from £28 to £30 for nitrate of ammonia when in normal times he can buy nitrogenous fertilizers with more than half the same percentage of nitrogen at less than half the price. Mr. Scott credits nitrate of ammonia with advantages over sulphate of ammonia and nitrate of soda—one leaves the constituents of sulphuric acid in the soil, the other leaves sodium behind it. Where these fertilizers are utilized in a scientific manner according to the nature of the soil and the character of the crops, farmers make no complaint, excepting that nitrate of soda gets washed out of the soil quickly if heavy rains come too soon. Sulphate has an advantage over nitrate of soda in this respect; but nitrate of soda is credited with quicker action at the outset, if retained in the ground. But before the war, and this year particularly, the farmer has been learning that, in the use of sulphate of ammonia, a rich harvest (if not spoilt by weather conditions) follows his enterprise. To nitrate of ammonia, Mr. Scott gives an excellent character. After it has yielded up its nitrogen, only the constituent water is left behind. There is, however, one objection. It is deliquescent. But careful experiments are being conducted in the hope of overcoming this. In our wet climate, this characteristic will prove a disadvantage. On the whole, we think, coke-oven owners will want more satisfactory evidence than is afforded by the paper that they would be doing the right thing to engage in a heavy capital expenditure in order to change-over from the production of sulphate of ammonia to nitrate of ammonia.

The Session's Parliamentary Gas Work Ended.

There were only eight Bills and two Provisional Orders in which gas was concerned lodged for the consideration of Parliament this session. The sources of the origin of the measures and their nature will be found recorded in the first two issues of the "JOURNAL" in January. With the announcement of Mr. Speaker last week that the Act of the Sheffield Gas Company and that confirming Gas and Water Provisional Orders had received the Royal Assent, all the measures have now completed their parliamentary journey. Over this handful of measures, the gas industry has not worried Parliament much. Beyond the ordinary routine, only a couple of them (speaking from recollection) have required the services of a Select Committee. There were as usual at the outset several petitioners against the Bills; but most of them were quickly satisfied. Oppositions were withdrawn; and the Bills went forward with alacrity through all stages. Some of the Acts will show considerable modification in detail contrasted with the original form in which they were deposited; but we will not attempt on the partial information at hand to say what the changes have been. When prints of the Acts are in our possession for review will be time enough to complete the story of the session's work. However, it can at once be said that the industry has not distributed much money this year in the shape of fees among the members of the Parliamentary Bar or the gas specialists at Westminster.

A Matter of "Paramount Importance."

Report comes from the several coalfields that gas undertakings whose current contracts will be automatically abrogated on Sept. 8 are pressing to get into stock as much coal as possible under the contracts; and colliery owners, it is stated, are doing their best to comply with the pressure. Storage for winter has now a companion incentive for pressing forward deliveries in the desire of the Ministry of Munitions that there shall be, except for surplus gas requirements, a cessation of water-gas making, and that coal-gas plant shall be worked to its fullest practicable extent, in order to supplement the production of tar. Nothing but imperative need [see third editorial this week] would have authorized a change in the Coal Controller's appeal to the industry to economize coal by utilizing blue-water gas, or would have found the Controller actively participating with the Ministry of Munitions in a change which is directly opposed to what he had himself been working for. The Ministry knows very well it is no use working coal-gas plant to its fullest possible capacity without there is the demand for gas; and we are now passing through the period of minimum gas consumption. Hence the notice by the Minister of Munitions at the beginning of last week impressing upon the public, in view of the "paramount importance" of meeting the increasing need for bye-products obtained from the carbonization of coal at gas-works, the desirability of using gas in preference to any other means of obtaining light, heat, and power. The recommendation will not be liked in certain quarters where the coal used does not yield bye-products; but circumstances will not brook any disapproval. What a blessing the crazy notions of certain people in the electricity supply industry were not realized a few years ago, and that the gas industry did not become extinct before the war started.

The Wilts Company Denouement.

We have now the denouement of one of the promotion plots of the United Gas-Works Development Company, Ltd.; and a discreditable winding-up it is. The particulars will be found in

our last and the present issue. Now that the final stage has been reached in which the Official Receiver and Liquidator have been actively engaged over the affairs of the Wilts County Gas Company, Ltd., there is no desire to greatly irritate old sores. But with the arrival of the expected and certain end, we remember that Sir George Kekewich, K.C.B., the Chairman of the poor weakling with an ill-fitting capital, was very much annoyed with the criticisms and contempt that we poured upon a promotion which those with any knowledge knew well was over-capitalized, and that the picturesque inflations which were presented to the public as a technical estimate of prospects had not the ghost of a chance of being realized. The deficiency between the value of the assets and the capital shows how the subscribers of hard cash have been fleeced; and the "progress" of the concern well illustrates how terribly far short the "technical" prognostications have fallen from the glory imparted to them by a vivid imagination. The question is now being looked into as to whether those who profited by this scandalous piece of imposition upon the public can be made to disgorge the profits, or part of them, made out of the transaction. We would suggest that the Directors' fees should also be repaid, in view of the disclosures made by the Official Receiver and the Liquidator; for it is no use members of the Board suggesting that they took those protecting precautions which the outside subscribing shareholders had a right to expect they would take. As a matter of fact, one of the Directors when warned only took umbrage at what was said, and blindly continued to tread the road that led to Liquidator and Official Receiver.

Conventions in War Time.

Announcements have been made of the indefinite postponement or abandonment, in consequence of the entry of the United States into the war, of the regular annual conventions of a number of American technical and other societies—including those of the Gas Institute, the National Commercial Gas Association, the Illuminating Engineering Society, and the Iowa District Gas Association. Whatever may be the opinion mostly favoured so far as the scientific bodies are concerned, it is evident that there is in the States a growing feeling against the postponement of commercial conventions and similar fixtures. The Associated Advertising Clubs of the World, at their recent convention, when there were 2000 members present, passed a resolution requesting President Wilson to exert his influence to encourage the holding of all customary business and other conventions during the period of the war. In the opinion of the members, this course is necessary in order to ensure the continuance of the present prosperous condition of the country's business, to the end that it may be possible for the Government to more readily secure the greatly enlarged income required to vigorously and speedily prosecute the war, and so that none of the necessary activities of commercial life may be curtailed. Looking at the matter from this point of view, the National Commercial Gas Association are being urged to rescind the resolution abandoning the convention which had been arranged for next November at Detroit, and to show the importance to the national welfare of the commercial side of the gas industry. The argument put forward in the pages of "The Gas Industry" is that conventions for serious, real work, and interchange of views are wanted now more than ever. The great need for domestic and industrial economies, it is said, makes the commercial side of the gas business of vital importance in the present emergency. That is, the nation requires a perfectly organized and specially efficient commercial side in the gas industry, in order that the real economies desired, "not the unwise throttling of industry that some have advocated," may be accomplished. The Merchants' Association of New York, too, have expressed the opinion that the postponement of commercial conventions is a false idea of economy, the application of which will be harmful, rather than beneficial, both to the Government and to the nation's business.

The employees and friends of the Hull Station of the British Gas Light Company, Ltd., last Saturday week gave their third entertainment to wounded soldiers and sailors. The guests were received on the Company's recreation ground by Mr. John Young, the Engineer; and games and competitions were followed by tea. The band of the Lancashire Fusiliers played selections during the afternoon.

OBITUARY.

Mr. W. Doig Gibb has received intimation that his elder son, Second-Lieutenant J. H. Gibb, of the King's Royal Rifles, was killed in action on the 31st ult. He was only nineteen years old, and left Dulwich College last Midsummer term to join an Officers' Cadet Battalion. For some years previous to that he was an enthusiastic member of the Dulwich College O.T.C.

Captain W. G. S. Curphey, M.C., R.F.C., son of Mr. W. S. Curphey, the Chief Inspector of Alkali Works, was reported missing on May 14; but news has since been received that he died on the following day in a German field hospital at Bouchain. He was 21 years of age. In 1914, he joined the Royal Berkshire Regiment, transferring to the Royal Flying Corps in 1916, in which year he was awarded the Military Cross.

PERSONAL.

Mr. A. P. Trotter, M.Inst.C.E., M.Inst.Mech.E., who was until recently Electrical Adviser to the Board of Trade, is now returning to professional practice, and is entering into partnership with Messrs. Handcock and Dykes, at No. 11, Victoria Street, S.W. In one connection or another, Mr. Trotter's name has frequently appeared in the pages of the "Journal." He is President of the Illuminating Engineering Society, Vice-Chairman of the National Illumination Committee of Great Britain (affiliated to the International Illumination Commission), and Chairman of the Joint Committee on Illuminating Engineering of the Department of Scientific and Industrial Research.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report.

The following is the report of the Directors of the South Metropolitan Gas Company for the six months ended the 30th of June, which will be presented to the proprietors at the half-yearly meeting on the 15th inst.

After taking into account the balance of £33,659 19s. 2d. brought forward from last half year, and paying the sliding-scale dividend at the rate of £4 13s. 4d. p.ct. per annum, there will remain a deficit of £1742 14s. 10d.

These figures support the decision—at which the Directors reluctantly arrived—to raise the price of gas to 3s. 1d. per 1000 c.ft. as from Midsummer. It is significant that of this price the payment for war bonus and war fund is now equivalent to more than 4d. per 1000 c.ft., to which must be added the enhanced charges for freight, and for interest on loans required by reason of the high cost of labour and materials and the necessity for maintaining an exceptionally heavy stock of coal.

In the half year there has been the satisfactory increase of 12 p.ct. in the sales of gas, partly due to the difficulties generally experienced by the public in obtaining raw fuel. This progress is in the right direction, as thereby increased supplies of residual products are available to meet the national requirements.

The yields of gas and residual products have been well maintained, having regard to the difficulty in obtaining coal efficiently cleaned.

Authority having been given by His Majesty's Treasury for the issue of temporary capital under the powers of the Company's Act of last year, it is proposed to raise by redeemable preference stock and debentures the sum of £750,000.

The staff and employees of all grades continue to give wholehearted service, assisted therein by more than fifteen hundred female workers.

Charles Carpenter, *Chairman.*

709, *Old Kent Road, S.E.* 15., *Aug.* 1, 1917.

[The accounts did not come to hand in time for our usual abstract to appear in this issue, which, consequent on the holidays, had to be made up for press on Saturday.]

Tar for Open-Hearth Furnaces.—Writing to the "Iron and Coal Trades Review," Mr. Albert Nash suggests, as one means of saving coal, the use of tar for open-hearth steel furnaces. Without taking into account the tar produced at gas-works, he says that, assuming "the number of bye-product coke-ovens in the United Kingdom at 8600, the coal carbonized at 5 tons per oven per day, and the tar recovered at 6 gallons per ton of coal (this is a very low figure, and would permit of the lighter oils containing benzol, toluol, &c., being distilled off and recovered for explosive or dye manufacture), we have a total of 94,170,000 gallons of tar per annum. Taking the B.Th.U. per pound as the same in both coal and tar, and knowing that each ton of steel made in an open-hearth furnace requires about 6 cwt. of coal, we find that for a ton of steel we should require 58·4 gallons of tar. This means that the tar figure above (94,170,000 gallons) would produce 1,612,500 tons of steel, and would liberate 483,750 tons of coal. This is not a large figure, and might be considerably improved upon in practice.

COMMERCIAL GAS COMPANY.

Half-Yearly Report.

THE following is the report for the first six months of this year, which the Directors of the Commercial Gas Company will present at the half-yearly meeting on Thursday, the 16th inst.

The Directors submit the accounts for the half year ended June 30, 1917. The revenue account shows a net profit for the half year of £41,732 17s. 1d., which, added to the balance of £75,867 6s. 5d. brought forward from the previous half year, produces a net revenue balance of £117,600 3s. 6d. Deducting £12,754 12s. 4d. for interest, there remains standing to the credit of the net revenue account a balance of £104,845 11s. 2d. available for dividend.

The Directors recommend the payment of dividends thereout at the statutory rates of £4 8s. p.ct. per annum upon the 4 p.ct. stock of the Company, and of 4 p.ct. per annum upon the 3½ p.ct. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

A resolution will be submitted to the meeting for increasing the remuneration of the Secretary.

WILLIAM GRAHAM BRADSHAW, *Chairman.*

Gas-Works, Stepney, July 31, 1917.

THE ACCOUNTS.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 30th of June amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed at the date named was £339,062 10s., and £135,937 10s. was added by conversion, making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. Capital account receipts amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,533,883 5s. with a nominal amount of £1,212,812 10s. added by conversion—together £2,746,695 15s. There is thus a balance of £140,630 10s. 7d. carried to the balance-sheet. A sum of £50,948 was expended during the half year on new and additional steamships, £5863 on buildings, plant, &c., and £224 on mains and services; but £5101 is credited for stoves and prepayment meters and fittings. The reserve fund amounted at the close of the half year to £41,568, and the insurance fund to £27,811—in both cases after allowing for depreciation on investments.

The following is the revenue account:—

Expenditure.

Manufacture of gas—						
Coal and oil, including dues, carriage, unloading, and trimming	£214,631	7	7			
Salaries of Engineer and officers at works	3,978	11	8			
Wages (carbonizing)	14,350	14	8			
Purification, including labour	1,968	12	11			
Repair and maintenance of works and plant, materials and labour (less £893 12s. 9d. received for old materials)	29,357	5	7			
				£264,286	12	5
Profit sharing				2,488	15	1
Distribution of gas—						
Salaries and wages of officers (including rental clerks)	£7,213	14	6			
Repair, maintenance, and renewal of mains and services, material and labour	8,252	9	7			
Repair and renewal of meters	3,534	9	3			
" " " " stoves	12,863	5	4			
" " " " prepayment meters and fittings	11,950	1	0			
Maintenance of mantles and fittings	1,448	7	5			
				45,282	7	1
Public lamps—lighting and repairing				3,491	6	8
Rent, rates, and taxes				17,453	7	6
Management—						
Directors' allowance	£1,250	0	0			
Company's Auditors	75	0	0			
Salaries of Secretary, Accountant, and clerks	1,243	11	9			
Collectors' salaries and commission	1,836	8	6			
Prepayment meter collection	5,892	13	4			
Stationery and printing	1,375	3	3			
General charges	3,174	4	7			
				14,847	1	5
Bad debts				277	1	3
Law and parliamentary charges				54	17	0
Superannuations and allowances and Workmen's Benefit Society, &c.				2,683	18	0
Official officers, &c.				90	1	8
National Health and Unemployment Insurance				596	7	4
Allowances to employees on active service				3,572	17	2
Total expenditure				£355,124	12	4
Balance carried to net revenue account				41,732	17	1
				£396,857	9	5

Receipts.

Sale of gas—						
Per meter (number in use, 116,823) at 2s. 8d. & 3s. per 1000 cubic feet	£261,715	7	11			
Public lighting and under contracts	5,099	5	8			
	£266,814	13	7			
Less discounts and allowances	13,751	18	2			
				£253,062	15	5
Rental—						
Meters (24,451)	£3,101	12	6			
Stoves (88,524)	14,410	14	5			
Prepayment meters and fittings (91,699)	18,265	5	8			
Maintenance of mantles and fittings	772	5	1			
				36,549	17	8
Residual products—						
Coke, less £5371 14s. 5d. for labour	£72,367	18	4			
Breeze, less £1364 19s. 8d. for labour	1,187	15	2			
Tar	14,951	18	5			
Ammoniacal liquor, sulphate of ammonia, &c.	18,708	6	11			
				107,215	18	10
Miscellaneous receipts—						
Rent receivable	0	0	0			
Transfer fees	28	17	6			
				28	17	6
Total receipts				£396,857	9	5

The following statements relate to the working:

Statement of Coal and Oil.

—	In Store Dec. 31, 1916.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store June 30, 1917.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	21,448	134,433	111,741	668	43,472
Oil—gallons	534,331	1,099,635	1,005,597	..	628,369

Statement of Residual Products.

Description.	In Store Dec. 31, 1916.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1917.
Coke—tons	6,390	72,631	9,535	64,275	5,211
Breeze—tons	4,211	7,850	...	6,143	5,918
Tar—gallons	672,348	1,298,342	..	1,435,158	535,532
Ammoniacal liquor—butts of 108 gallons	14,682	36,477	35,879	2,805	12,475
Sulphate of ammonia—tons	170	953	..	1,097	26

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
2,112,848	30,985	1,881,594	1,944,272	3804

The final statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, oil, &c., £89,641; coke and breeze, £6539; tar, ammoniacal liquor, sulphate of ammonia, &c., £12,652; sundry stores, £54,014—total, £162,847. The figures this time last year were: Coal, oil, &c., £27,944; coke and breeze, £2071; tar, ammoniacal liquor, sulphate of ammonia, &c., £8229; sundry stores, £44,599—total, £82,843.

A TREATISE ON SMOKE ABATEMENT.

FINDING that, compared with other subjects, the number of books bearing on smoke abatement is small, Mr. H. Hamilton, A.R.San.I., a Qualified Smoke Inspector, and late Lecturer at the Middleton Technical School, set himself to fill a gap in the literature by preparing a treatise* for the purpose of instructing all those who seek information with regard to the matter, but more especially the student who proposes to sit for the examination of the Royal Sanitary Institute. The author states in his preface that it will be found to cover entirely the syllabus issued by the Council of the Royal Sanitary Institute; and if this is the case, its usefulness to those for whom it is more particularly intended is obvious. The Smoke Inspector has to be acquainted with a great many things; and thus the ground covered by the book is extensive.

In the first place, there is a history of smoke abatement, and an explanation of the chemistry of combustion; and then follows a chapter on furnace draught, the composition of chimney gases, and CO_2 recorders. A number of well-known stoking appliances are described and illustrated; and a chapter on smoke and its effects concludes with the true deduction that the stoker must be an intelligent man, and, furthermore, that he must understand what it means for him to pollute the atmosphere with black smoke. At the same time, for smoke prevention, it is not so much the stoker himself, as the method of stoking he adopts, that must be depended upon. It is quite evident, the author says, that the prevention of smoke depends on the complete combustion or burning of the fuel; and this is best secured by the maintaining of a high temperature in the combustion chamber. He considers the question of the admission of the necessary amount of air, and states that experience proves the plan of leaving the furnace a little open after charging to be a suitable method.

The important part played by producer gas plants in the abatement of the smoke nuisance is acknowledged, and particulars are given of typical plants. The same remark applies to town gas, oil, and electricity, though in this case the number of pages occupied is smaller. The domestic coal grate is, of course, not overlooked.

* "A Scientific Treatise on Smoke Abatement," by H. Hamilton. Sherratt and Hughes, Manchester; 1917. Price 5s. net.

Gas Calorimeter Tables.

The United States Bureau of Standards has recently issued [Circular No. 65] a supplement to Circular No. 48—"Standard Methods of Gas Testing"—as a result of numerous requests for a brief and concise set of operating directions for a gas calorimeter, and for a convenient set of correction tables. The tables are arranged in a sequence most convenient for use in connection with the proposed record sheet issued by the Bureau. The record forms for calorimeter tests shown in the circular have been used in America for some time and found to be complete and convenient.

ELECTRICITY SUPPLY MEMORANDA.

The pendulum swings with irregular movement between two phases of electricity supply affairs. At one time thought and discussion in electrical circles are concentrated on the reorganization of the industry, with the view to more economical production and supply of heating and power energy; at another time the men of the industry are swimming over with congratulation one to the other on the rich harvest that awaits their reaping after the war. The physical disabilities of electricity for competing effectively in some fields is a matter that does not disturb in the slightest. Electrical men rejoice and are exceeding glad because they simply believe that great things are in store. Soberly considering the situation, it is evident that the provision of cheaper B.Th.U. is a condition precedent to a large expansion in the domestic and industrial heating field; and electricity stands very badly in this respect. But there is no determinate view as to how electrically produced B.Th.U. are to be delivered to consumers at a cheaper rate than they can obtain heat by combustion means—by the use of gas or solid fuel; and value for money must always be the first consideration in commerce. The much abused Board of Trade Electric Power Committee may direct to the means of creating a thermal and money parity between electricity and combustion methods. But we have our doubts. At present, the schemes under contemplation range from linking-up existing systems to putting-down a few large concentrations of generating plant at the pit-heads or the nearest available points, including coal carbonization either in coke-ovens or by a low-temperature process, with the utilization of the gas under steam-boilers or directly in internal combustion engines for electricity generating purposes. There are a few sensible electrical men—like Mr. Hugo Hirst of the General Electric Company—who do not scorn the idea that it may be a very economical thing to transmit gas from the places of plant concentration as well as electricity. But we hear nothing about the financial aspect of these various schemes in comparison with existing plants, nor what is to be done with the capital that already reposes in the urban undertakings. This is a trifle which troubles few.

Simple Faith.

Carbonization, Centralization, and Distribution.

The amorphous ideas that possess some electrical men on, for example, the subject of carbonization have been previously noted in the "Memoranda." There are easily gullible ones in the electrical industry who have notions that the low-temperature carbonization system is the one that should be adopted in the future development of their fuel operations. Why they think so has never been made clear from the technical standpoint; and we doubt whether any of them could tell, other than by quoting the stock tale of ingenious men, some of whom know much more about company promoting than engineering and chemistry. It has been amusing to see ancient statements seriously quoted by modern electrical engineers, who have shown both a want of personal knowledge and a faith that beggars description in their interested tutors' teachings. We are sorry that a recent discussion before the Birmingham Section of the Institution of Electrical Engineers has not been published. In the course of it, Mr. E. W. Smith, M.Sc., the Chief Chemist of the Birmingham Corporation Gas Department, had something to say [*ante*, p. 195] which must have shaken a bit the confidence of some of the then present electrical votaries of the low-temperature coal carbonization system. The construction of large plants near the pits for the production of smokeless fuel and gas, combined with electricity generating plants, with in view the saving of coal freights, is, he holds, quite a delusion and a snare. We have pointed this out before, though not specially in connection with low-temperature carbonization. The ultimate cost to the consumer is the thing that matters. Bearing upon this comes the question: Is the distribution of electricity from the pit-head by cables and of gas by pipe-lines going to be successfully carried out within (so as to obtain a saving) the difference in cost of, on the one hand, conveying coal, and, on the other hand, the solid and liquid products derived from its pithead carbonization. These latter would still have to be transmitted by rail throughout the country, which is contrary to Nature's thoughtful provision of a compact portability in the form of solid coal, so that the variety of wealth contained in it can be conveniently separated therefrom where and as required. As Mr. Smith says, the solid fuel produced by the low-temperature system would amount to 75 p.ct. of the original coal, and the space occupied by it in trucks would be greater than that of the original coal. Wagon hire would accordingly be increased. Moreover, it is surely wasteful to leave in the solid residue at least 10 p.ct. of volatile matter, or between 30 and 40 p.ct. of that which was originally available in the coal. This volatile matter is the very material from which some of the much-wanted products are procured. Besides this there is the point not mentioned by Mr. Smith, that few coals yield at low temperatures a good coke; and if, for the purpose of producing good coke at low temperature, selection has to be made of the coal used, this means a considerable addition to the cost of the coal purchased, if the demand for special sorts becomes large. Moreover, the electrical industry, being in search of a larger heating load, does not want to promote the output of a smokeless fuel competitor in the shape of low-temperature coke. The low-temperature system, too, is wasteful in gaseous products and ammonia. There are, however, some electricians who fancy the employment of coke-ovens. The demand for metallurgical coke has its limits; and at these limits, assuming the coking industry is prepared to give up to the electrical industry its place in the coal-carbonizing world, ends the hope of adopting this particular system as the root of the operations of electricity supply.

The Objectionable Gas Industry.

It is easy enough to see the reason why electrical men cut-off at low-temperature carbonization or carbonization in large bulk (as practised by the coke-oven industry) consideration of this question of the better utilization of the bituminous coal that now finds its way into the greedy jaws of the furnaces of their steam-boilers. It is simply because of the competing relations of the gas industry that electrical engineers will not look at the possibilities that exist in its established position and its products in effecting a working business union, though they know of no carbonizing method that can use a ton of coal to better advantage. Plant, organization, statutory powers, and everything else are in existence that tend to economic service; they only need extension and adaptation. But the electrical industry has its doubts and fears as to a union with the gas industry. The fears have their origin in doubt as to what would be the ultimate end of such an alliance. Whatever the end, we have not the slightest doubt that it would be the one directed by the natural evolution of things in the matter of the provision of light, heat, and power for the use of our urban communities and industries. However, of this thinking electrical and other technical men who know anything of coal carbonization are fully persuaded—that the present destructive use of coal and all it contains for the one purpose of producing electrical units each possessing a heating value of only 3420 B.Th.U. cannot, and will not, be permitted to continue indefinitely. Yet the readiest solution of the problem is the most objectionable. We ask electricians to think over the size and operations of the gas-works of the country, of the large percentage of gas sold for heating and power, of the extraordinary fluctuations that take place in the gas demand for heating between season and season, day and day, and even hour and hour, and see what these things mean in relation to generating plant, cables, and the ambitions of the electricity supply industry with its 3420 B.Th.U. electrical unit.

A Vision, and a Disturbing Element.

Not only in the electricity supply industry, but in all departments of the firms manufacturing electric appliances, there is "buoyant confidence." So writes the Electrical Correspondent of "The Times Engineering Supplement." Public and private consumption of electricity must in his view "tend" to increase, and "probably" at a rapid rate. The guarded manner in which he makes this statement is noteworthy. No doubt he has in his mind's eye the plant representing present capital expenditure, and the cost at which capital, materials, labour, and fuel will stand for some long time ahead. But being an "Electrical Correspondent," it is his business to make the best of the position. However, it is, in his view, inconceivable that national policy will permit of the full resumption of the sort of mischievous foreign competition which was sorely felt for many years before 1914. The scheming of the German trust groups is now known to have been directed to much more than the filling of order books. It was deliberately designed to infect with a chronic sickness the British manufacturing groups. Although it is impossible to make an estimate of the work already visible and tangible, he sees that the capacity of the plant and apparatus factories is likely to be low in proportion to the business awaiting the conclusion of peace. The electrification of railways, the equipment of mines and factories, the general spread of domestic applications, the greater use of electricity in marine engineering and in agriculture, will overtax their power of production. He is looking far ahead of the probabilities sanctioned by existing conditions. It is feared by some manufacturers—those now making and dealing in small generating machinery, with gas, oil, or steam prime movers—that the great pending technical reform will put them out of business; but the optimistic correspondent gives them temporary heart by assuring them that they will have a few years in which to turn round, even supposing that by 1930-40 the whole country is getting its electricity from a couple of dozen grand central stations. Still requiring the services of these manufacturers will be numerous isolated power users in districts disdained for the time being by the trunk mains; and there is always refuge to be found in the making of consumers' appliances. It is a beautiful picture; but over it, so far as domestic and industrial heating operations are concerned, there hangs as a cloud the generating end, as well as the relation of the low thermal value offered by electricity to the greater generosity of other means of meeting public requirements. Electricians may propose; but public patronage determines. And a factor in the determination is value for money.

Humour from Hornsey.

While referring to electricity for domestic heating, and as a supplement to a paragraph that appeared in the "Memoranda" last week, we may allude to a criticism in "Electrical Industries" of efforts to push expensive electric heating at Hornsey. The Electricity Department there have issued a circular on the subject of domestic heating, which our contem-

porary thinks a little ill-advised. The circular states: "Having regard to the possible difficulties with coal supply during the coming winter, it is desired to point out to consumers the very great convenience of electric-heaters. By installing electric-heaters, you will to a considerable extent safeguard yourself against any coal shortage, and will, in effect, increase your private coal stock." The circular proceeds to point out that electric-heaters are very efficient and effective, and extremely adaptable for heating any part of the house. We will not criticize the "convenience" of an electric-heater. As to the "efficiency and effectiveness," many users have shown an inappreciation by changing-over to gas-fires. Upon the question of cost, the paragraph of last week—bearing the side heading "The Coal Controller's Advice"—had something to say. But our electrical contemporary thinks the advocacy of Hornsey may do more harm than good to the electric heating business. Among other scathing remarks, we find this: Electric heaters "are emphatically not an economical substitute for the continuous heating of rooms at the tariff now charged in Hornsey—2½d. per unit. If, in obedience to the notice, any consumer were to use a 2 KW. electric-fire for warming his sitting-room, the first quarterly bill would be equivalent to culpable homicide." And this by the use of only *one* heater! Two units for fourteen hours a day would cost 5s. 10d.; and a week of this would run away with £2 0s. 10d. Our contemporary thinks that "supply undertakings which cannot (or think they cannot) supply current for heating at something like 1d. per unit would be well advised to leave the heating business alone." Even 1d. per unit, cold weather, and fourteen hours' use per day would mean 2s. 4d., and a week 16s. 4d.! And this—granting in charity the absurd claim of 100 p.ct. useful heating efficiency—for only 6480 B.Th.U. per hour. The stress of the times is difficult enough without the cost burden of heating by electricity. But there is a humorous side to this attempt to impose in this matter upon the untutored public.

Electric Steel Furnaces.

There is one field—that of steel making—in which the electric-furnace has obtained a footing, and would establish itself at faster pace if the electrical heat energy could be supplied at a cheaper rate. In an article in the "Iron and Coal Trades Review," Mr. E. Kilburn Scott states that of the Greaves-Etchells type of electric steel furnace, more than thirty have been installed or put under construction since Jan. 1, 1916, that very soon there will be fifty electric-furnaces at work in the Sheffield district, and that the output of steel from them will be at the rate of upwards of 200,000 tons a year. In a comparison with the crucible steel process, Mr. Scott says it may safely be stated that a 10-cwt. electric-furnace running a charge every two-and-a-half hours, or (say) nine charges per day, will do as much as 36 crucible furnace holes, each having two 56-lb. pots. The electric-furnace is operated by one skilled man, one unskilled man, and one ammeter boy, whereas the crucibles require fifteen men. The electric-furnace only takes up about one-quarter of the space occupied by, and can be installed at about half the initial cost of, the crucible plant. Owing to low heat efficiency and high cost of labour, crucible steel is declared to be much more expensive to manufacture; but the article omits actual costs. The expense of renewing crucibles is considerably higher than the renewal of an electric-furnace for the same output. The author also holds that the crucible steel process has been largely responsible for waste of the nation's resources, by reason of the coke used being made in beehive ovens—this quality of coke being necessary for the process. He thinks the electric-furnace should help to stop this waste in the future. How so? Does the Sheffield electric generating plant incorporate coal-carbonizing and bye-product recovery processes? And what is the average consumption of coal at the Sheffield electricity generating station per 3420 B.Th.U. delivered to the users of electric-furnaces? Since this paragraph was written, we learn from the Statistical Report of the Iron, Steel, and Allied Trades Federation that the total number of electric furnaces built or building in 1916 was 91, against 45 in 1915.

Wounded Men in France.

Regarding the kindly desire of M. Rouland, the President of the Société Technique du Gaz en France, to be furnished with information as to wounded British gas men lying in hospitals in France, so that they may receive attentions from himself or his colleagues [*ante*, pp. 13, 15], Mr. Walter T. Dunn will be glad to receive, at the offices of the Institution of Gas Engineers, No. 39, Victoria Street, S.W., particulars from further engineers who have members of their staffs or men in hospital in France.

Association of British Chemical Manufacturers.—Representatives of the Association of British Chemical Manufacturers had an interview last Thursday with Dr. Addison (the Minister of Reconstruction), who invited them to co-operate with him in preparing to deal with the problems which will arise in the chemical industry after the war. It was arranged that the Council of the Association should act as an advisory body in connection with this branch of the work of the Ministry of Reconstruction, and that Mr. Charles Carpenter, D.Sc. (the Chairman of the Association), Sir William Pearce, M.P., Mr. J. F. L. Brunner, M.P., and Mr. J. W. Wilson, M.P., should form a Committee to discuss with the Department the best methods of procedure.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

The Annual General Meeting.

The Fifty-Eighth Annual General Meeting of the German Association of Gas and Water Engineers was held on June 22, at the premises of the Association of German Engineers in Berlin. The first portion of the summary of the proceedings taken from the reports in the "Journal für Gasbeleuchtung," by the official reporter of the meeting (Herr Heidenreich), consisting of a general review by him of the circumstances in which the meeting was held, was given in the "Journal" last week [p. 188]; and the following are the minutes of the proceedings.

I.—Opening of the Meeting.

The President (Herr Hase, of Lubeck) opened the meeting at 9.15 a.m. He referred to the course of the war during the past year, and concluded his speech with a cheer for the German Emperor, which was heartily responded to by the meeting. He then welcomed all those present, and especially the guests, and read a message of congratulation from the Association of Gas and Water Engineers of Austria and Hungary. After alluding to the losses which the Association had sustained by death, he mentioned that Professor H. Bunte, the Acting General Secretary, had been made an Honorary Doctor by the Technical College of Vienna.

II.—Position of Gas and Water Works in Wartime.

The President then gave his promised lecture on this topic. He spoke first of water-works, which had earlier experienced a decrease, and later an increase, in consumption. The changes in consumption appeared to be due to reductions in the size of households and the restriction of industry on the one hand, and to the erection of hospitals and new munition works on the other hand. The fuel consumption of the pumping-stations had increased owing to the poorer quality of the coal. Diesel engines had had to use tar as fuel; and coke and breeze grates had been installed very extensively. Many difficulties had ensued from the poor quality of the lubricating oil used; and on this account many works had had to lower the temperature of the steam employed. Substitutes for lubricating oils had not in most cases proved satisfactory. Many difficulties had also ensued from the dilution of the trained staff; but, nevertheless, no very serious interruptions of water supply had been reported anywhere.

Gas-works had suffered especially from the shortage of coal, with the consequence that in various towns there had been considerable interruptions in the supply of gas. Limitation of consumption, which must necessarily follow a shortage of coal supply, was not in the national interest, because reduced delivery of gas meant an increase in the general consumption of coal. All efforts therefore should be directed towards maintaining the supply of coal to gas-works. The shortage of staff had also caused many difficulties on gas-works. The Council of the Association had been endeavouring to bring about an equitable distribution of the coal-tax. The President also referred to the problems confronting the Association in regard to the after-war period, proposals for re-organization, the difficulties of works in hostile countries, which generally speaking had been greater than in Germany, and, finally, he mentioned the "lamentable attacks on Germany which had appeared in the English Technical Press."

Herr E. Körting (Berlin) expressed the thanks of the meeting to the President for his lecture, and went on to speak of the coal supply to gas-works. He was of opinion that the quantities of coal of which gas-works were now short could very well be withdrawn from the coke-ovens; and that a restriction of gas should be advocated only in very urgent cases. Herr Permien, of Rostock, spoke in the same sense, and said that following up the President's statement, efforts should be made to obtain a special ordinance to provide for the coal supply to gas-works. Herr Kümmel, of Charlottenburg, observed that the restriction of the operations of water-works which the authorities had in mind would cause great difficulties, and would be impracticable without incurring the risk of serious breakdowns in the service. Herr Scheller, of Landshut, wished to see uniform restriction of all works; whereas Herr Permien, of Rostock, considered that local conditions should be taken into account. Herr Lempelius, of the Central Gas Bureau, said that gas-works should be supplied in 1917 with the same quantity of coal as in 1916. The President expressed the opinion that efforts should be made to secure authority for the managers of gas-works to restrict consumption in case of necessity as seemed best to them. Herren Falk, of Graudenz, Liepel, of Griesheim, and Georgi, of Viersen, also spoke on the question of coal supply.

Herr Kuckuck, of Heidelberg, referred to a fire which had broken out in a Rank's coal storage tank or silo at his works, which he attributed primarily to the mixing of different coals when being put into store. Herr Jäckel, of Plauen, also referred to a fire in the coal-storage tank at his works, and the measures adopted by him to prevent further outbreaks. Herr von Gässler, of Hanau, recommended the subdivision of the tanks or silos into smaller compartments.

Herr Ohly, of Cologne, then made a report on gas-works bye-products, dealing with the circumstances which affect the market,

the effects of State embargoes, the encroachments of coal distributing depôts, and the utilization of gas coke in industries where other materials have hitherto been used. Herr Terhaerst, of Nuremberg, expressed the opinion that tar-distillation plant was only suitable for adoption in large gas-works. The plant at his works had been erected primarily in order to make them independent of the tar buyers' rings, but also to produce tar oil for use as a fuel for power production on the works and to recover oil for naphthalene extraction. Herr Kayser, the Chairman of the Coke Bureau, read a paper on Coke as Fuel, which is to be published shortly.

Professor H. Bunte next spoke. He dealt with heating problems, the complete gasification of coal, and the displacement of other fuels by gas. He concluded that the old recommendation to "cook by gas and heat by coke" was still sound policy. He advised that coal should be bought and sold not according to its size, but according to its value in use.

Herr Terhaerst further reported on the trials which had been made at his works with electro-motors which were designed to be proof against risk of causing fire. The safety appliances of the firm of Schuckert appeared, according to his observations, to answer for rooms in which there might be escapes of coal gas, but not when the escaping gas was one very rich in hydrogen [? hydrogen for air-ships]. Dr. Leybold, of Hamburg, referred to the use of electromotors in the apparatus houses of gas-works, from the standpoint of the workmen's accident insurance scheme. He had come to the conclusion that the necessity for their use had not been proved, as it was everywhere possible to employ steam-engines. Herr Terhaerst recommended that the investigations should be pursued, and Herr Schallenberg, of Dresden, vigorously opposed Dr. Leybold's attitude, and advocated freedom to use electro-motors in the apparatus houses of gas-works.

Herr Reinhard, of Leipsic, lamented the lack of labour, especially for the retort-houses, and stated that he had petitioned for the return to him of all his retort-house hands who were now with the colours. Herr Körting, of Berlin, said that, according to his experience, there was no prospect of such a petition being answered favourably.

III., IV., & V.—Annual Report, Accounts, and Estimates.

The annual report of the Council of the Association, having been circulated in print, was taken as read, and approved. The accounts for the past year were similarly approved by the meeting, and the estimates for the ensuing year were presented and accepted. [A summary of the annual report will be given in an early issue of the "Journal."]

VI.—Technical Committees.

The Committee on Standards was dissolved—its work being handed over to the Committee on Pipes. Herr Götze, of Bremen was elected as Chairman of the Water-Works Committee, in succession to Herr Reese, of Dortmund, resigned. The President reported to the meeting the terms of a new contract which the Council had made with the publishing house of R. Oldenbourg, of Munich, in respect of the "Journal für Gasbeleuchtung," which is the official organ of the Association. The meeting approved the new contract.

VII.—Election of Officers.

Herr Julius Geyer, the General Manager of the Gas Industry Company of Augsburg, was elected a Vice-President in succession to Herr Terhaerst, of Nuremberg, whose term of office had expired. Herr Ries, of Munich, proposed, and the meeting decided with acclamation, that Herr Hase, of Lubeck, should be re-elected as President of the Association for another (the third) year. The three members of the Council whose term of office had expired were replaced by Herren Terhaerst, of Nuremberg, Runge, of Dantzig, and Schwers, of Osnabrück. The Central Gas Bureau, having become affiliated to the Association in the same way as the eight District Associations, is entitled to a representative on the Council, and Herr Frahm, of Baden-Baden, was chosen as such.

The proceedings terminated at 2.30 p.m.

GAS AND WATER WORKS IN WAR TIME.

THROUGH GERMAN EYES.

[Presidential Address of Herr M. Hase, of Lubeck, at the Annual Meeting of the German Association of Gas and Water Engineers on June 22.]

We live in a time of perpetual changes and growing difficulties. How are others faring? Is it right to speak of these things? Certainly the proverb says that "Silence is golden." But there are cases in which it is our duty to talk; and one of these cases is presented by this meeting, at which we review the happenings of the past twelve months. . . . Allow me to draw a picture of the past events and effects of the war. Last year, I dealt solely with the effect of war on the gas industry, and refrained from dealing with water-works, which therefore may now appropriately be referred to first of all.

Water-Works as Users of Coke and Tar.

Obviously water-works should not be affected by the war to the same extent as gas-works, as they are not conducted from the standpoint of industrial so much as of social and hygienic interests. There is no incentive to increase output—rather reasonable economy in consumption is aimed at. . . . Consumption has fluctuated, as a result of the war, up or down according to local conditions. [The author proceeded to discuss at considerable length the causes of fluctuations in the consumption of water in various localities, the increases in the number of consumers, the supply and renewal of water-meters, and the scarcity of outdoor staff and plumbers, which was especially felt during the prolonged frost of last winter.]

There has been great difficulty in obtaining the requisite supply of fuel for the pumping-stations, though only temporary lack of coal rather than a general shortage has been reported by most water-works. In critical cases the military and railway authorities have provided relief, because they had a great and direct interest in the maintenance of the water supply. Since the autumn of 1916, however, deliveries of coal have been most uncertain; and if there is no change in the present generally extremely unsatisfactory coal supply, it is to be feared that some water-works will be put out of action. The same is true of water-works which use gas or electricity for power; for though hitherto, with few exceptions, supplies have been adequate, the prospect is now disconcerting. If gas and electricity works are compelled, owing to scarcity of coal, to restrict their working or shut off the supply at certain periods, the distribution of water will be imperilled. Happy are the water-works (not an inconsiderable proportion of the whole) which have the advantage of a natural fall from the source of supply to the district.

The question of the substitution of other fuel—especially coke—for coal, has been taken up with good results at many water-works; but, generally speaking, it is better to leave gas coke for domestic use, as its employment by water and other public works only intensifies the insufficiency of the fuel supply to the general public. From 10 to 40 p.ct. or more of coke has been mixed with the coal for boiler fuel—the coke being sometimes ordinary gas coke, sometimes oven coke, and at times small coke, coke breeze, or coke dust, while brown coal, briquettes, and wood have been used. It is desirable that the results of these attempts to displace or dilute coal for boiler-firing should be published.

The increased cost of coal delivered has so far averaged 45 p.ct.; but it is still advancing. The quality of the coal has fallen off greatly—more especially recently; so that there has been a rise in coal consumption equal to 10 to 50 p.ct. per 1000 gallons of water distributed, or a reduction in the efficiency of the pumping-station plant per pound of coal used of 10 to 25 p.ct. The conditions have been especially unfavourable for works using Diesel engines or other engines consuming liquid fuel. Gas-oils and tar-oils were obtainable only in small quantities, and deliveries were unreliable. It was necessary to keep other sources of power in reserve. Similarly suction-gas engines had to be provided with a supply of town's gas for use in case of need. Since the autumn of 1915, the Diesel engines at Hamburg have used only coal tar as fuel. By recourse to emergency supplies of power, however, it has been generally possible to avoid serious interruptions in the supply of water.

The type of grate is a matter of great importance in connection with the substitution of coke for coal. With the plane or horizontal grate, stoked by hand, there is generally no difficulty—especially if a blower can be used. With skew and rotary grates, however, only coke of a certain size, free from breeze, can be used, and mechanical stoking has to be discarded. Broadly speaking, however, the use of unusual or inferior fuels has not caused difficulty. Most trouble has arisen from coal that gives ash which fluxes readily. Boilers with ample water space in conjunction with steam-engines have responded best to war conditions. It has been necessary to cut-out superheaters, in order to reduce the steam temperature, on account of the inferiority of the lubricants available. It has frequently been necessary to increase the number of shifts where coke was used, owing to the lower physique of the stokers, and the substitution of hand for mechanical stoking. But there have been a few cases of reversion from eight-hour to twelve-hour shifts.

Engine Troubles.

Except where pre-war stocks have sufficed, ill-effects have been felt from the character of the packing and lubricating materials now available. Inferior oil has been mainly responsible for bearings running hot, cylinder obstructions, valve-troubles, &c. More oil was used, and engines, apparatus, and oil-feed pipes needed cleaning more frequently than formerly. Much of the mischief caused will be realized only when the war is over. Opinions are divided as to the utility of adding graphite to the oil. Heavy greases cannot take the place of oil, though they may be used in conjunction with it. Scarcity of grease packings necessitates more frequent renewals. It is reported from Hamburg that the packing-rings of the pistons of horizontal engines have needed renewal or cleaning more frequently, but that this has not been the case with vertical engines, for which, however, the degree of superheat of the steam has been lowered. Thanks to good stocks at the outset, the scarcity of rubber, asbestos, copper, bronze, &c., has not yet been seriously felt by most undertakings. But metallic packings on steam-engines could not be renewed, and stuffing-boxes for ordinary packing had to be substituted. Bronze valve rings had to be replaced by lead-coated sheet iron. War-metal valves have proved unsatisfactory; but the bronze bushes of pumping-engine shafts have been satisfactorily replaced by white

metal ones. Rubber springs were less durable than formerly. Substitutes for leather for washers, &c., of pump-valves were also less durable than leather. The materials used as substitutes in water-meters, valves, taps, hydrants, unions, &c., have not generally been in use long enough for final judgment to be pronounced on them. The character of the water has an important bearing on the success of some of these substitutes.

DEPLETED STAFFS.

Water-works have perhaps suffered less than gas-works from shortage of staff. But in some cases only a few elderly hands have been left. In one town of 10,000 inhabitants the engine-room work is done entirely by an engine-man of 63, assisted by a 17-year-old youth. The attention of the staff still left has in most cases had to be concentrated on maintaining the supply of water, and in a few instances even filtration has at times had to be neglected—let alone meter-reading and testing, waste-inspection, &c. The help of prisoners of war has been comparatively rarely resorted to. They work slowly, and at the best only passably well. They do only one-half to two-thirds the work of the practised German workmen. Russians are more willing and industrious than the more intelligent Frenchmen. One large works reported very bad results from the employment of Russian prisoners of war; but this was as nothing in comparison with its experiences with Belgian civilian workmen, who, on account of their derisive behaviour had to be sent back post haste.

Women have been but little employed on the works, though extensively on the outdoor staff. One report is that for heavy work six women do about as much as three old or feeble men, or as two ordinary men in peace-time. They are often absent on account of urgent domestic duties, indisposition, &c., and dislike Sunday and night work.

In imperative cases, where other labour has been unobtainable, the military authorities have lent men to water-works for short or long periods. The managers of works, however, have to go hither and thither to get the necessary permits—the War Office machinery not always working well in this respect.

In a few instances the profits of water undertakings have been maintained or increased; but generally speaking they have fallen. Figures for several undertakings obtained by the author show an average fall of 13 p.ct. in 1916-17 compared with 1913-14. The rates charged for water have not generally been raised. Where it has been done, it has been either an increase of 1d. to 1½d. per 1000 gallons or a war surcharge of 5 to 20 p.ct. on the total of the account. It is anticipated, however, that rates generally will be increased very shortly. The incidence of the coal-tax is one of several reasons for the impending rise.

Broadly speaking, water-works have not been affected by the war to the same extent as gas-works. The community, however, owes a debt of gratitude to the managers, staffs, and employees of water-works for their devotion to duty, as evidenced by the fact that in very difficult conditions of labour, supply of coal, and facilities for renewals and repairs, they have succeeded in maintaining so good a service.

(To be continued.)

COAL GAS AS A MOTOR FUEL.

There is published with the August issue of the "Bulletin of the British Commercial Gas Association" a report on the possibility and practicability of the use of coal gas in lieu of petrol or benzol as a fuel for driving the engines of motor vehicles. Drawing attention to the matter, "F. W. G." says:

The report makes it clear that on the score of cost coal gas, even at war prices, has a marked advantage over petrol, the basis for comparison being that, varying with the quality of the gas and of the petrol available, from 300 to 250 c.ft. of gas equal in propelling power a gallon of petrol. So that petrol would have to be supplied at from 10d. to 1s. per gallon to compete with coal gas at 3s. 4d. per 1000 c.ft. This is only in confirmation of experience previously obtained by the substitution of gas for petrol for the running-in of engines in the shops of motor-car makers, which has been done to their marked advantage by a number of leading firms. The report also points out that, so far from the use of gas instead of petrol having any disadvantage from the point of view of maintenance, it has the advantage of keeping the valves, &c., free from deposits.

The *crux* of the whole question, however—the serious obstacle to the wholesale substitution of gas for petrol, at any rate during the war—is that of storage. The carriage of sufficient gas for a comparatively short journey in a flexible container (or gas-bag), such as is being used successfully on a number of chars-a-bancs, trams, omnibuses, and other vehicles, obviously is not much more than a make-shift, and can have no wide and general application to the problem of motor fuel. It will probably have a considerable, though still limited, vogue during the war, and until the supply of motor spirit returns to something like pre-war conditions; but if coal gas is to take a permanent and substantial place among motor fuel, some satisfactory means will have to be devised for carrying it under compression in containers of adequate strength, but not excessive weight.

The prohibition of the use of steel during the war for the construction of such containers has for the present rendered the necessary amount of experiment on these lines impracticable, and the adoption of the system impossible. But the report clearly indicates that, when experiment is possible, it will be eminently desirable, and is very likely to prove fruitful. That is as far as the question can be carried at the moment; but it will be pursued to a conclusion as soon as ever the time is ripe. Meanwhile, if facilities can be provided, preferably at garages, for supplying a considerable quantity of gas in a short space of time—say 500 c.ft. in ten minutes or a quarter-of-an-hour—there is little doubt that many users of vehicles suited to the carrying of gas-bags of that capacity will resort to the cheap fuel which is obtainable in lieu of the dear fuel which is scarce or non-obtainable.

THE RECONSTRUCTION OF INDUSTRY.

By THOS. NEWTON.

THE task of devising ways and means for the ultimate reconstruction of industry is rapidly becoming a matter of supreme national importance; and the problems involved merit the most careful consideration of all sections of the community. While a certain amount of boldness and originality in grappling with the many intricate details of the proposed reconstruction are eminently desirable, it should be borne in mind that these self-same intricacies require very delicate handling if the interests and welfare of all parties are to be anything like permanently reconciled. It is true that trade union rights and privileges have been waived to an unprecedented extent in order to facilitate output; but it would be a mistake for anyone to assume that the Unions concerned will indefinitely acquiesce in the *status quo*.

RESTORATION OF THE OLD CONDITIONS.

The Government, in a great national emergency, and in its laudable anxiety to obtain an immediate and ungrudging response to its insistent requirements, repeatedly pledged itself to a restoration of the old industrial conditions after the cessation of hostilities, without particularly either knowing or caring whether or not such procedure would be possible or desirable. The line of least resistance was thus mapped-out and followed; and it is only fair to state that it served its immediate purpose. The trade unions fastened on the pledge, notwithstanding the frequent charges which have been levelled against restriction of output, which is alleged to exist even to-day in some trades, although an unrestricted output was definitely understood to be one of the conditions of the contract. However, as the Government has recently felt constrained once more to renew its assurances and repeat its pledge to organized labour, it is well worth while considering what is involved. While it may be true that organized labour is satisfied in the abstract that the pledge will be redeemed, it is extremely doubtful if organized labour desires to see the entire fulfilment of the promise in the concrete.

Under the old conditions, an era of wasteful competition ran riot. Wages paid were comparatively low. Selected industries of only minor importance were unduly emphasized, while important key industries were either entirely lost to this country, or were rapidly in danger of becoming strangled. Output was notoriously restricted, irrespective of its baneful economic and commercial effects; and our man-power was prodigally wasted by a slavish adherence to many antiquated methods and processes. To scrap machinery, however obsolete, was considered by some manufacturers to be little short of a crime. Hence, highly-skilled labour was retained to perform work upon obsolete machines, and in some cases was expected to do economical work in the absence of machinery, notwithstanding the fact that better economic work could be obtained by unskilled labour in the presence of, and with the aid of, modern machinery. Under the old conditions, dilution of labour—a clumsy misnomer—was not to be thought of for a moment; and the net result of a policy of the conservation of the worst elements of industrialism was reflected in an industrial "marking time."

These, then, are a few of the old conditions which were securely entrenched in industry at the outbreak of the war, and which should be borne in mind when the restoration of the old conditions is seriously contemplated. A bare review of this by no means exhaustive list of them shows how inimical the old conditions are to the interests of both masters and men. After a spell of phenomenally high wages, it may be taken for granted that organized labour will be very loth to return to the old rates of pay, just as employers who, having invested in modern machinery—thus obtaining a greater output with less skilled labour—will also be loth to return to the methods and standards of production which characterized the old conditions. During three years of war industrial productiveness has probably developed at a greater rate, and to a larger extent, than it would have done in a quarter of a century; and to ignore the war lessons in productivity would be tantamount to annihilating industrial invention and development. Clearly, then, a return to the *status quo ante bellum* would be unthinkable, and against the best interests of all concerned.

POSITION OF THE SKILLED WORKER.

In any consideration of the problem of the reconstruction of industry, the position of the skilled worker is a matter of the utmost delicacy, calling for sympathetic and frank treatment. By means of financial sacrifice, through the instrumentality of his trade union he has sought to improve his status, and win for himself and his fellows certain rights and privileges which constitute an industrial charter. This charter is defined by laws, rules, customs, and usages, both written and unwritten; and it almost goes without saying it is jealously guarded. Any violation of its terms is

violently resented—unless it progresses in a direction favourable to the worker. Now, in order to obtain the standpoint of the skilled worker, one must needs project oneself mentally into the position of a man who, having a cherished possession which he has been induced to relinquish temporarily, suddenly realizes the impracticability and undesirability of regaining possession. But, alas! he has nothing to take its place—no effective substitute. And this is likely to constitute his grievance. There is just a slight suspicion in the minds of organized skilled workers that they have been negotiated into a false position which is likely to work out to their ultimate disadvantage; and this has had not a little to do with the recent exhibitions of labour uneasiness. Unfortunately, in the past they have seen every effort in the direction of increased production reflected in a scientific and systematic reduction of piece rates; and while the exigencies of the war have somewhat interfered with this time-honoured arrangement, there is a lurking suspicion that this arrangement will be speedily reverted to as soon as the times are propitious. Thus are the old antagonisms likely to be perpetuated, unless some common-sense methods prevail. In any desirable scheme of industrial reconstruction there is no real necessity either to restrict production or depress piece rates; and it should be borne in mind that nothing is likely to be so unsettling, or so prejudicial and detrimental to the industrial future of this country, as to attempt to restrict production on the one hand, or on the other to encourage unlimited production simply for the express purpose of cutting wages.

A Community of Interest.

Viewed in the true perspective, the skilled worker, no less than the unskilled, should look forward with every confidence to the industrial prospects of the future; and this also applies to employers generally. There have been in the past legitimate grievances on both sides; but there is now rapidly accumulating evidence of an earnest desire to reconcile outstanding differences, to the mutual satisfaction of both parties. It daily becomes more apparent that a community of interest exists between employer and employed, and nothing is so much needed to make it really effective as mutual confidence and a common understanding on essential details. A community of interest implies first of all the location, and then the removal, of all avoidable causes of friction.

Problems of the Future.

Whatever illusions the employers and employed of this country may suffer from, it is to be hoped that nobody will cherish the illusion that in the future industry will flourish by adhering to the haphazard methods of the past. British industry to-day stands confronted with the chance of a lifetime; and if only an intelligent policy can be agreed upon, the future is secure. Happily, the Government realize that the time is now opportune for a comprehensive review and discussion of the whole subject; and the scheme of National Councils, District Councils, and Works' Committees is an earnest of their intention to deal fully with the various aspects of the many problems involved. It is a healthy sign that the proposed bodies are not to confine their discussions merely to grievances; but there is just the danger lest the element of professionalism should creep in and dominate the proposed organizations.

The Sub-Committee of the Reconstruction Committee has certainly outlined an ambitious programme; but the chief thing to guard against is the development of academic discussions redolent of the debating society. Practical discussion of the many aspects and numerous details of the reconstruction of industry is eminently desirable; and plenary powers are essential, since it would surely be expecting too much of busy men to discuss plans, and formulate schemes, with all their ramifications, unless they were also empowered to put them into operation. Assuming, however, that duly-appointed representatives of both employers and employed jointly agreed to adopt a given scheme in relation to a particular subject, unswerving loyalty to the scheme should be the order of the day, with a view to reaping all the advantages involved. Viewed from this standpoint, the lengthy list of subjects for negotiation referred to by the Reconstruction Sub-Committee cannot fail to produce some startlingly beneficial results.

STOPPING AND RE-STARTING A GAS-WORKS.

Experience at Angers, France.

A further communication to the one-day congress of the Société Technique du Gaz en France dealt with the precautions which were taken by the works at Angers (Maine-et-Loire) in the circumstances of a compulsory cessation of gas making for a period of seven days, in consequence of total lack of coal. The supply of gas was stopped simultaneously with the cessation of carbonization; customers being given two days' notice by proclamation by the municipal authorities and in the Press.

The plant consisted of eight batteries of horizontal retorts, 6m. (20 ft.) in length, heated on the Lachomette recuperative system, and producing about 4500 cb.m. (159,000 c.ft.) of gas per day. The hydraulic mains were independently connected to the pipes from the retorts, each by a flap-valve with outside screw adjustment. On the completion of the carbonization of the charge, the hydraulic mains were completely filled with water, and the valves closed. The coke was kept in the retorts, and the latter left sealed. The dampers for the primary and secondary air were closed, and that for the chimney of the furnace bench was lowered. The furnaces were then maintained at a much lower degree of heat by supplying them with coke in quantity about half that employed in full working. At the time of the stoppage the gasholders contained about 10,000 cb.m. (353,000 c.ft.) of gas. The inlet valves were left open so as to maintain a free passage from the scrubbers, washers, and other works plant. The opportunity was taken to clean the two works meters thoroughly, and to renew the material in a large purifier, which was then left open.

The town pipes, to a total length of 150 kilometres (93 miles), are supplied by a works main of 400 mm. diameter (15¾ in.), which encircles the chief part of the town; the whole supply system having a capacity of about 1200 cb.m. (42,400 c.ft.) The average difference of level between the works and the higher part of the system is 25 m. (82 ft.). The districts served by the works include a low-lying quarter, on the banks of the Maine, of 20,000 population; the principal quarter, of 40,000 inhabitants, on the slope of a hill; and a higher district, of 30,000 population. The latter is supplied with gas by six smaller branches from the chief main.

As it was seen that the stoppage would be for a short period, and in view of the comparatively large quantity of gas in the holders, the inlet valves from the works were not closed. Efforts were made to maintain a pressure of 3 mm. (1-10th in.) at the lowest point of the system. A recording manometer was fixed there, and the daily records used to follow the fluctuations in pressure. While a pressure of 3 mm. was kept up at the lowest point, the manometers in the highest part of the system registered 25 to 28 mm. (10-10ths to 11-10ths). Consumers had been requested to close the taps attached to all burners and meters; but the consumption of gas by those in the highest quarter gave rise to further loss from the mains which was estimated at 1200 to 1500 cb.m. (42,400 to 53,000 c.ft.) per day. On the sixth day of stoppage, it was found that the manometer in the lowest part of the system had registered the occurrence of 10 mm. (4-10th in.) vacuum during two hours. In view of this disquieting observation, and of the continued use of gas in defiance of the explicit prohibition, it was decided to resume working on the following day on the strength of the delivery of a very inferior consignment of coal from a Channel port.

In starting work again, the primary-air dampers were first opened; then those of the secondary air. The gases ignited at the burners without accident. The normal temperature of the furnaces was obtained only after 48 hours. The water in the hydraulic mains was brought back to its usual level, the gas-valves were opened, and ordinary working re-started. The purifier and one of the works meters, referred to above, were taken into use 36 hours later.

Consumers were advised of the resumption of operations by a widely distributed notice, which was issued for the purpose of indicating the means to be taken for the avoidance of accidents. All the burners used in the public lighting service had been carefully closed before the stoppage. About one-fourth of these, in different parts of the town, were re-lighted during the night preceding the re-starting, after having slightly increased the pressure at the works. The resumption of the supply of private consumers was attended with no ill-effects, except that the consumption on the first day was less than one-third of the normal—probably as the result of fear of accidents against which customers had been cautioned. The general conclusion from the experience at Angers is that, while the present difficulties in France in maintaining a regular supply over a system of nearly 100 miles are very great, the difficulties and danger of entire cessation are so much greater that the latter course is to be avoided if in any way possible.

Utilization of Peat and Brown Coal.

Now that it is possible to convert inferior fuels (such as peat and brown coal), with a relatively high degree of efficiency, into gas by generators and to make practical use of them as sources of power, the interest in them is increasing. In Northern Germany, where water power is not easily available, the high and low bogs are, it is said, "destined to furnish the fuel needed for the generation of electricity." The experiences of the overland power plant in the Auricher Wiesmoor have conclusively proved that with a peat consumption of 2 kilos (4·4 lbs.) per KW.-hour the peat bogs are "an economically useful source of power of great extent and duration."

Irish Association of Gas Managers.—The annual meeting of the Association is fixed for next Tuesday, in the Council Chamber, City Hall, Belfast, under the presidency of Mr. A. S. Brook, of Lisburn. In addition to the formal business and the address of the President, there will be a discussion on the formation of a Commercial Section, to be introduced by Mr. T. J. Reid, of Ballina; and two papers are to be read—one by Mr. F. G. Ambler, on "Intermittent Vertical Retorts for Medium-Sized and Small Gas Undertakings," and the other by Mr. P. J. Philpott, of Mallow, on "Exceptional Difficulties Experienced in Administration." There will be a break in the proceedings for light refreshments, on the invitation of the President; and in the evening the annual dinner will take place at Ye Olde Castle Restaurant. By permission of the Gas Committee and Mr. J. D. Smith (the Engineer and Manager), the members will be able to visit the Belfast Corporation Gas-Works on Tuesday afternoon, after the session is over. For the following day an excursion has been arranged to Newcastle, co. Down.

MANUFACTURE OF NITRATE OF AMMONIA BY ELECTRIC POWER AT COKE-OVEN PLANTS.

By E. KILBURN SCOTT.

[Extracts from a Paper read before the Coke-Oven Managers' Association at Sheffield, July 28.]

The author, in the course of his communication, suggested that, instead of the ammonia of coke-ovens being made into sulphate, it should be turned into nitrate of ammonia, which is a more valuable product per unit of combined nitrogen—the dilute acid required for the purpose to be made from air in arc-flame furnaces, with energy generated by the surplus gas or waste heat of the coke-ovens. The opening portions of the paper were as follows.

Whenever reference is made in papers or articles to the bye-products of coal, utilization of the ammonia is always assumed to be as sulphate of ammonia. In order to make this compound, sulphuric acid has to be purchased at prices which are fixed by the Acid Associations; and, further, it has often to be carried to considerable distances, which adds to the expense. In peace time, there is usually plenty of acid; but since the war it has been very scarce, owing to so much being required for reacting with Chili nitrate, to produce nitric acid by the ordinary Valentiner method, universal in this country.

By the purely chemical process, about 30 p.ct. of the sulphuric acid comes away as acid sodium sulphate mixed with sodium sulphate after each charge—the mixture being called nitre cake. In order, in some measure, to make up for the scarcity of acid, nitre cake is used in various industries—for example, to remove oxide or scale from metals after they have been annealed; for extracting grease from wool suds and other uses in the textile trades; for mineral water factories, &c. Nitre cake has also been tried for mixing with acid to make sulphate of ammonia; but it is hardly suitable, because of the considerable admixture of sodium sulphate. The position as regards sulphuric acid has grown steadily worse, because of the difficulty of obtaining sufficient sulphur and pyrites with which to make the acid, and also the difficulty in finding wagons, &c., with which to transport raw materials and finished acid. This paper proposes to show that manufacturers of coke can easily turn their ammonia bye-product into nitrate by means of acid of their own manufacture, and also that by making their own acid they become entirely independent of the Acid Associations, who have for so long controlled the supplies in this country.

The nitric acid required for nitrate of ammonia may be very dilute—of (say) 25 to 33 p.ct. strength; and it is easily and cheaply made from the air by electric power. This process is not new, because nitric acid has been made from air on a very large scale for many years in Norway, Italy, and France. Further, one of the most striking scientific developments of the war has been the way in which Germany, by the fixation of atmospheric nitrogen, has become entirely independent of Chili nitrate and sulphuric acid supplies.

Atmospheric nitrogen may be fixed in two ways—first, as ammonia; and, secondly, as nitric acid. In order to fully appreciate these methods, it will be useful to set out the various ways of making the two compounds.

AMMONIA.

Ammonia can be made: (*a*) As a bye-product in the manufacture of coke in regenerative and in waste-heat ovens. (*b*) As a bye-product in the manufacture of lighting and heating gas, for town supply. (*c*) As a bye-product in the Mond process for production of power gas from slack coal. (*d*) As a bye-product in the application of the Mond process to the production of power gas from peat. (*e*) As a bye-product in connection with distillation of bastard and lignite coals. (*f*) As the direct product by the action of superheated steam on calcium cyanamide, which latter compound is obtained by fixation of atmospheric nitrogen with calcium carbide. (*g*) As the direct product of the synthetic combination of atmospheric nitrogen and of hydrogen in the presence of a catalyst, by the process due to Prof. Haber.

When ammonia is obtained as a bye-product of the distillation of coal, the cost may be, as in the case of most bye-products, only a little above the interest charge on the recovery plant, *plus* the cost of operating same. It certainly is not correct to arrive at the cost of bye-product ammonia by deducing the value from the market price of sulphate of ammonia. About £30 a ton, or 3¾d. per pound, is quite high enough to take for pure ammonia; but the proposal to make nitrate of ammonia at coke-ovens would still be a good commercial proposition, if the ammonia was at a higher figure.

As a comparison, it is of interest to determine the cost of ammonia made from calcium cyanamide. As the cyanamide and the carbide from which it is made require electric energy, clearly the rate for electric power is a factor. We may assume that ½d. per unit, which for 8000 hours a year is a little over £4 per KW.-year; and at this rate the cost of the cyanamide may be taken at £10 per ton. To produce a ton of ammonia requires about 4½ tons of cyanamide, containing 20 p.ct. of nitrogen; and therefore the cyanamide will cost £45. In addition, there are certain other manufacturing costs; but, to cut it short, we will take a total of £50 a ton, or about 5½d. a pound.

It would be interesting to know the cost of synthetic ammonia as made by Haber's method from pure nitrogen and pure hydrogen. Although we can arrive at the costs of the two gases, the other data are not available, because the process is only in use in Germany.

NITRIC ACID.

Nitric acid can be made in any of the following ways: (*a*) The action of sulphuric acid on sodium nitrate or Chili saltpetre. This method is practically universal in this country. (*b*) The fixation of atmospheric nitrogen by the direct process, using electric arc flames. This method is employed on a very large scale in Norway, and is in use in Italy, France, Germany, and Austria. A factory is to be built in Manchester. (*c*) Oxidization of ammonia in the presence of a catalyst, by the process due to Prof. Ostwald. This method is employed on a large scale in Germany, and is also in use in Italy. France, and Belgium. A small plant has been built at Dagenham Dock, in Essex.

When discussing the cost of nitric acid, one method is to assume it as of 100 p.ct. purity, though in practice, of course, there is no such pure acid; and for the manufacture of most compounds, quite low percentage strengths will do. When made from Chili saltpetre costing (say) £10 a ton, which was approximately the price before the war, the cost of pure acid may be taken at £20 a ton, or (say) about 2·15d. a pound. The price of Chili nitrate is now nearer £25 a ton; and as the cost of sulphuric acid has also gone up, and everything else in proportion, the present cost of nitric acid must be upwards of £50 a ton.

In order to compare the cost of nitric acid as made by the direct arc-flame process, I propose to take the cost of electric energy at ½d. per unit, or about £4 a KW.-year of 8000 hours. Assuming a yield of 200 grams of 33 p.ct. acid per KW.-year, which is equivalent to 66 grams of pure acid, the cost of pure acid can be shown as about £13 10s. a ton, or 1·44d. per pound.

The oxidization of ammonia into nitric acid depends on the cost of the ammonia; and if we take it at £50 per ton, the cost reckoned as pure acid should be about £25 a ton. It is to be doubted very much, however, if it can be made at this figure, owing to the lack of experience of the process, and the very high cost of the catalyst—platinum—which is continually having to be replenished.

NITRATE OF AMMONIA.

We have now to consider the various methods for making the ammonia and the nitric acid into nitrate of ammonia. As it happens, several methods are in use, which would not be commercially possible under ordinary peace conditions; but the war demand is so great for explosives, that it does not appear to matter what any method costs. The following are briefly the various systems.

1.—By direct mixing of strong ammonia with strong nitric acid made from nitrate of soda. This method is employed by Chance and Hunt.

2.—By the reaction of sulphate of ammonia with calcium nitrate or nitrate of soda. This method is employed by Brunner, Mond, & Co.

These are purely chemical methods, whereas the two following depend on the use of catalysts.

3.—By the combination of ammonia made from calcium cyanamide with nitric acid made from the ammonia by a catalyst. This method is employed in France and Germany; and a factory has been built at Dagenham Dock, Essex.

4.—By combination of ammonia made by the synthetic or Haber process, with nitric acid made by the oxidation of ammonia by a catalyst. This method is employed on a large scale in Germany.

There is finally the purely electrical method with which the paper is mainly concerned.

5.—By direct mixing of ammonia liquor, of about 25 p.ct. strength, with dilute nitric acid made from the air by the direct arc-flame process.

POWER FROM COKE-OVENS.

The scheme proposed is that gas from regenerative coke-ovens, or the steam raised by waste-heat ovens, should be utilized in an electric power house built by the coke-oven proprietor, and some, if not all, the energy be employed for making nitric acid from air—this acid to be then combined with ammonia from the ovens to make nitrate of ammonia. In other words, it is proposed that coke-oven proprietors should manufacture nitrate with home-made nitric acid, instead of as at present making sulphate with purchased sulphuric acid. Power may be obtained by using the surplus gas from regenerative ovens in gas-engines.

Though a battery of fifty coke-ovens will give 2000 to 2500 KW.,

I propose to deal with figures for a power-plant capable of generating 1000 KW. continuously, and an electro-chemical factory to utilize this amount of energy. For a total of 1000 KW., the best size of generating unit to adopt is 500 KW.; and it is advisable to have three such units—one of them being spare. On this basis, the approximate cost of a power-house plant to utilize coke-oven gas in direct-coupled gas-engines would be £28,000; or of plant to utilize waste heat to raise steam for turbines, £29,000. Electric power houses are now so standardized, and the installation and running so simple and straightforward, that coke-oven proprietors need not hesitate to instal their own plant. They would find it more profitable to themselves utilize the surplus gas and heat, than to sell it to others to exploit. Leaving a fair margin of profit, electric energy ought to be supplied from such a power-house at ⅛d. per unit. At this figure, 1000 KW. for 8000 hours a year would bring a return of

$$\frac{100{\cdot}0 \times 8000}{8 \times 240} = £4166$$

From this must be deducted the standing charges, labour, and stores, and also any figure that the coke-oven proprietor feels justified in charging for the gas or waste heat. As he is selling to himself, it is merely a matter of book-keeping.

The Nitrate Plant.

The author then proceeded to describe the apparatus required to fix atmospheric nitrogen as nitric acid; the arc-flame furnace referred to being one specially developed by him for the purpose. It differs from those in use abroad in that it is a self-contained three-phase unit, and as such has various advantages.

The manufacture of nitrate of ammonia is carried out by running the dilute nitric acid for the absorption plant into a closed iron tank containing ammonia solution in which the ammonia is at about 25 p.ct. strength. Acid is slowly added to a large volume of liquor, and an agitator mixes them together; the heat of combination being carried off by cooling-coils, as well as by circulation of air. The addition of acid continues until nearly all the ammonia is taken up, leaving a slightly alkaline reaction. The ammonium nitrate solution is then run through a filter into vacuum pans, where evaporation is effected by steam-coils at a pressure of 20 mm. of mercury.

When nearly all the water has been evaporated, the solution passes into long troughs slightly inclined and subjected to a rocking motion. The nitrate forms into small crystals with no enclosure of liquor; and after the crystals have been dried in a hydro-extractor, they are placed in bags or barrels ready for market. The nitrate is absolutely pure.

In the above it is mentioned that the ammonia is brought up to 25 p.ct. strength, and that concentration is absolutely necessary in order to reduce the water when the solution has to be carried any distance. Nitrate of ammonia can, however, be made with solution of much less strength. In fact, it has been demonstrated at Bristol that nitrate can be made direct from ordinary gas-works liquor, by acting on it with dilute nitric acid. Of course, when made in this way, the nitrate is not so pure as when made by the other processes; and a great deal of evaporating plant is necessary.

Estimate of Cost.

The yield of acid may be reckoned at 1½ tons of 33 p.ct. nitric acid per KW.-year—that is to say, 1500 tons from a plant utilizing 1000 KW. This is based on a yield of 66 grams of concentrated acid, or 200 grams of 33 p.ct. acid per KW.-hour. As a matter of fact, greater yields are obtainable; but the figure named is sufficient for the purpose, and to show the sequence of the calculations.

Assuming that the electro-chemical plant costs £8000, and utilizes 1000 KW. for 8000 hours per annum at ⅛d. per unit, the expenses are:

Electric energy	£4166
Depreciation, 10 p.ct. on £8000	800
Salaries, wages, stores, royalty, &c.	1790
	£6756

This, for an output of 1500 tons, gives £4 10s. per ton of 33 p.ct. nitric acid, or the equivalent rate for pure acid is £13 10s. For a plant to utilize ten times the amount of energy, the cost should be well under £4, even taking the above figures for the yield.

The cost per ton may now be set out:

1500 tons of 33 p.ct. nitric acid at £4 10s.	£6,750
125 tons of pure ammonia at £30	3,750
	£10,500

As this produces 635 tons of ammonium nitrate, the cost is £16 10s. per ton.

In addition to ammonium nitrate, there is the sodium nitrate-nitrite. This may be assumed at 1·10th ton per kilowatt-year; and it is readily saleable. It should be worth £1500 a year.

Before the war, nitrate of ammonia made by the electric process in Norway was sold in large quantities at £28 to £30 a ton. Properly speaking, there is no quotation now, because all the make is taken by the Government for explosives. Its minimum price may, however, be fairly taken at double the above figure.

Uses of Nitrate of Ammonia.

A number of uses of nitrate of ammonia are cited in the paper, among them, the author believes that after the war it will come into use as a fertilizer. As a matter of fact, he said, the expert gardeners of France and Belgium have used it for intensive cultivation for some years. When sulphate of ammonia gives up its nitrogen for plant food, it leaves the constituents of sulphuric acid in the soil; also, when Chili nitrate gives up nitrogen, sodium is left behind. Both these are detrimental; and it is therefore usual for farmers to rest the land occasionally from artificial fertilizers. The chemical symbol for ammonium nitrate—namely, NH_4NO_3—shows that the nitrogen exists in part as ammonia-nitrogen, as in sulphate of ammonia $(NH_4)_2\,SO_4$, and also in part as nitric-nitrogen, as in Chili nitrate $NaNO_3$. It will be readily appreciated that by having its nitrogen in both these forms, nitrate of ammonia is an all-round fertilizer. Also it has the advantage that, when it gives up its nitrogen to plants, only the constituents of water are left behind.

The principal objection to nitrate of ammonia is that it is deliquescent; but this is likely to be overcome, and careful experiments to this end are now being conducted.

MELTING POINTS OF REFRACTORY MATERIALS.

The melting-point of fire-brick is stated by Mr. W. H. Barr, in "Industrial Engineering," to be the lowest observed temperature at which it begins to exhibit transition from a rigid towards a fluid condition. But the crushing strength cold, behaviour under load when heated, and resistance to fluxes, may also be regarded as important practical considerations. The melting-points of forty-five samples of fire-brick, clay, bauxite, silica, magnesia, and chromite, were determined in an electric furnace, the temperatures being measured by an optical pyrometer.

Common fire-brick is made of clay of which the essential is $Al_2O_3\,2(SiO_2)$. According to Shepherd and Rankin, this compound cannot exist at temperatures approaching the melting-point, but is decomposed into $Al_2O_3SiO_2 - SiO_2$. All commercial silicas melt at as low as 1600° C., but possess so much viscosity that they do not change shape until a much higher temperature is attained. Kanelt obtained 1750° as the point at which they flowed distinctly. So the actual temperature of melting is very indefinite, but is more even with the finished silica bricks. Bauxite is an impure $Al_2O(OH_4)$, and when heated Al_2O_3 is formed, which melts at 2012°. But neither the material nor the brick made from it was found to approach that point. A sample of the mineral melted at 1820°; the centre of the nodules cintering at 25° lower; and the bauxite clay at 1790°. A brand of magnesia brick melted at 2165°; and the melting-point of pure MgO is doubtful, but presumably higher, as the brick was of a dark brown colour, and contained iron. Among the pure materials tested were kaolin, melting at 1740°, silica at 2010°, and chromite at 2180°.

Batley Gas Accounts.

The accounts of the Batley Corporation Gas Department for the year ended March 31 show a net profit of £70, as against an amount in the previous year of £1843, and in the year 1913-14 of £4587. During the last-mentioned year, the department yielded £4750 in aid of the rates. This year only £50 has been taken. In the past ten years the department has yielded net profits amounting to a total of £37,518, and has given £42,764 to the rates. Whereas in 1914-15 the sale of gas was nearly 190,000,000 c.ft., it fell in 1915-16 to 172,111,600 c.ft. During the past year, the sales have been only 153,102,000 c.ft. The price of gas during the past year was 3s. 1d. and 3s. 5d. per 1000 c.ft., whereas ten years ago it was only 2s. 1d. The past year's income, owing to the high prices, rose to £38,149—a record for the department; but the expenditure advanced to £27,774, not including £10,304 loan charges. The cost of coal increased by nearly £1800, as compared with the previous year. Repairs and maintenance cost £1250 more; the outlay in this direction having been £2800, much of the plant being in need of renewal. There is a good deal of local criticism of the Corporation's policy in having in past years taken such big sums from the gas profits to the relief of the rates.

Melbourne Metropolitan Gas Company.—Messrs. John Terry & Co., of No. 7, Great Winchester Street, E.C. (London Agents for the Metropolitan Gas Company of Melbourne), have been advised by cable that the profits of the Company for the half year to June 30 last were £95,255. A dividend of 6s. 6d. per share has been declared for the six months; a sum of £30,000 has been transferred to the reserve fund; and the balance of £60,509 carried forward. Dividends will be payable in Melbourne probably on the 1st inst.

Irish Peat for Gas-Plant Needs.—It is expected that one of the questions to be investigated by the Committee just appointed by the Government to inquire into Irish peat resources will be that of finding how far such peat would suit the needs of gas plant. A member of the Committee has pointed out to an interviewer that the difficulty with peat for power production is its bulk, as compared with coal, in proportion to heat value. One gas plant, however, he added, is using peat in Portadown, and is working well, although advantage is not being taken of the bye-products. In Germany, gas plants working on peat are now producing power of over 3000 H.P. The Irish peat bogs are very extensive, and at present peat moss litter and peat dust for packing and mixing with molassine feeding stuff are the chief industrial uses to which the peat is put in that country.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Gas Light and Coke Company and Standard Price Alteration.

SIR,—The decision of the Directors of the Gas Light and Coke Company not to hold a half-yearly meeting or to issue a half-year's statement of accounts is, no doubt, dictated by a praiseworthy desire for economy, reinforced by the difficulties caused by a temporary or reduced staff. It is none the less to be regretted, especially having regard to the considerable reduction in dividend and the apparent absence of any serious endeavour to get the standard price adjusted in accordance with the alterations in the basic factors upon which it was originally fixed.

It will, I think, be generally admitted that the sliding-scale principle is the best that has yet been devised for combining the interests of shareholders and consumers. But it is essential, if this aim is to be reached, that the standard price shall be a fair one; and it is obvious on the face of it that, owing to the change in economic conditions, this is no longer the case.

Why is no attempt being made adequately to deal with this injustice, which is causing so much unnecessary hardship to shareholders? Are Directors afraid of being charged with profiteering? If so, surely these fears are groundless. The essence of such a charge is that advantage is being taken of conditions created by a state of war to make an abnormal rate of profit; whereas shareholders in the companies affected would be happy to receive the very moderate pre-war rate of return on their investment, notwithstanding the general rise in the value of money that has since taken place.

Let us look at the facts. The dividend for 1913—the last complete year previous to the war—was at the rate of £4 17s. 4d. p.ct. This has now been reduced to £3 14s. 8d. p.ct., owing to an increase in the price of gas of 10d. To provide a sufficient amount to pay the pre-war rate would require a further increase in price of a little over 1½d. per 1000 c.ft.

I would not for a moment minimize the importance of another 1½d. on the price of gas—small as this is as compared with the total rise due to the increased cost of manufacture. And it may be that commercial considerations would preclude any further increase, although such a statement would require considerable proof. But if it were so, of course, the shareholders would of necessity have to put up with the reduced dividend whether the statutory restriction existed or not. If, on the other hand, it is due to a standard price working unfairly, it would seem to be the clear duty of the Directors to take steps to get it altered; and the idea will present itself that if what is now generally referred to as "ginger" is wanted, it might have been provided by the abandoned shareholders' meeting.

ARTHUR VALON.

5, *Victoria Street, Westminster, S.W.* 1,
Aug. 2, 1917.

Determining the Gas Production Goal.

SIR,—In your editorial of last week, headed "Determining the Gas Production Goal," there is strong evidence that you have unwittingly misinterpreted some of my remarks on gas quality made before the Society of Chemical Industry the previous week. The use of the term "Industrial Fuel" was, I feel, an appropriate one to the Society.

My point, *re* railway companies and blue water gas, was not that any gas engineer would be desirous of supplying blue water gas alone, but that the railways, in concentrating on the question of low inerts, are in effect demanding a higher calorific value per cubic foot.

Your reference to the "broader thought on the subject" of lower calorific value—which has come to Birmingham—is, however, the important misinterpretation, or misreading, of my remarks. In the first place, any opinions I have expressed are solely intended to represent my own views, and not necessarily Birmingham's. Secondly, my reference to the lack of economic or scientific reasons for the adoption of a reduced calorific value, and the opinion I expressed—that, without extraneously supplied inerts, it was impossible to produce, with present methods of carbonization, a gas of 500 B.Th.U. gross from the coal alone—should, I now realize, have been amplified.

I am convinced that it will pay the gas industry to maintain an average calorific value of about 550 B.Th.U. gross.

It has yet to be proved that low-grade gas of 500 B.Th.U. gross is cheaper than that of 550 B.Th.U. gross, assuming that the former has to be at least 10 p.ct. cheaper than the latter, to put the two gases on a comparable basis.

I am confident a very strong case will be made out by engineers in the future for low inerts and higher calorific value than the present accepted standard; and it will be on the grounds of cost production—not cubic feet, but of heat energy.

I am sure you will welcome this explanation of my views on this matter. It is too important a subject to be left open to any misunderstanding.

E. W. SMITH, Chief Chemist.

Central Laboratory, Nechells Gas-Works,
Birmingham, Aug. 1, 1917.

[Welcome is given to Mr. Smith's explanation, because we agree that the subject principally referred to in it is one that should not be left open to any misunderstanding. We have not seen the full text of our correspondent's paper; and we cannot admit that we have "misread" his remarks as sent to us by our representative at the meeting. We may have misinterpreted his intentions; but he frankly confesses that he now realizes the opinion he expressed on the subject of gas production and calorific power should have been amplified. He mentioned in the paper that variations of quality in gas supplies are bad; and that so far [this is according to the report sent by our representative] it had not been possible to produce from the average coal, and using the usual methods of carbonization, 500 B.Th.U. gas, though this quality had been turned out by a number of gas-works. The argument strikes us as being an extraordinarily good one for, at any rate—without entering just now upon the question of the economy of blue water-gas dilution—preventing variations of quality in the supply, and for ensuring a good combustible gas, by having a standard fixed which can be economically maintained from available coal supplies without foreign assistance. There is here an economic question for determination. It will be observed that, in our reported remarks, there is no mention in the sentence referred to of "extraneously supplied inerts;" and even now there is, in the construction of the amended statement in Mr. Smith's letter, a little ambiguity: "Without extraneously supplied inerts, it is impossible to produce, with present methods of carbonization, a gas of 500 B.Th.U. gross from coal alone." Of course, what Mr. Smith means is not that it is impossible without extraneously supplied inerts to produce, &c., but that unless extraneously supplied inerts are kept out of the gas, it is impossible, &c. Mr. Smith is a member of the Gas Lighting Heating, and Ventilation Research Committee, whose new work was described by Professor Cobb at the meeting of the Institution in June as "the determination of the comparative efficiency in use of gas of different grades; so that, now that we are coming to a time of reconstruction, the legal and historical influences which have mainly determined gas standards should be set on one side in favour of more rational and scientific influences, and that we should investigate the comparative efficiency of gas standards, in order to obtain some definite and reliable figures for the guidance of all concerned." Mr. Smith, as a member of the Committee, enters upon the work already "convinced" that it will pay the gas industry to maintain an average calorific value of about 550 B.Th.U. gross, and "confident that a very strong case will be made out by engineers in the future, for low inerts, and *higher* calorific value, than the present accepted standard; and it will be on the grounds of cost production—not cubic feet, but heat energy." However, we welcome this explanation of Mr. Smith's personal views—quite apart from his membership of the investigating Committee who have these questions in hand, though this fact adds additional interest to the opinions he has expressed.—ED. G. J.]

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Willey & Co., Exeter.

Mr. W. THORNE asked whether the Minister of Munitions was aware that Messrs. Willey & Co., of Exeter, was a controlled firm; that they had not paid their workpeople the advances granted in the engineering trade by the Committee on Production; that lads of eighteen and sixteen years of age were only receiving wages varying from 16s. 8d. to 10s. 6d.; that women workers had been kept short of eight weeks' back-money at the rate of 4s. per week in respect of advances granted by statutory orders; and if he would take action in the matter.

Mr. KELLAWAY, in reply, said complaints on the first and third points raised had already been received and were being investigated by the Department. He was causing inquiry to be made into the second point also.

Clerks in Electric Light and Gas Offices.

Sir H. DALZIEL asked the President of the Board of Trade why so many clerks of military age in the offices of electric light and gas companies were allowed to be badged and classified by the companies themselves as skilled workers; whether these men (many of whom are in Class "A") were engaged on clerical work which women could do; and whether, in view of the pressing demand for men by the military authorities, he would take the necessary steps to have debadged all men of military age employed by electric lighting and gas companies as clerks.

Mr. KELLAWAY, replying for the President of the Board of Trade, said that all war service badge certificates were withdrawn on May 7 last. The protection from recruitment of the clerical staff of electric lighting and gas companies was dealt with in some cases under the Schedule of Protected Occupations; in others, by local tribunals. The schedule provided that in electrical and gas undertakings certified by the Ministry of Munitions under the Munitions of War Act, technical staff and clerks possessing high technical knowledge should be protected from the age of 25 upwards, and other clerical staff from the age of 32, or below that age if they were not fit for general military service, category "A." He was not aware that any category "A" clerks below these age limits were being protected in undertakings dealt with under the schedule.

The Secretary of the General Union of Braziers and Sheet Metal Workers (Bolton Branch) has intimated to the Bolton Corporation Gas Committee that an advance of wages of 3s. per week for men and 1s. 6d. per week for apprentices under eighteen years of age has been arranged between the Sheet Metal Employers' Association and the Joint Committee of the Union. The advance has been approved by the Committee on Production, to come into operation on the 1st inst.

REGISTER OF PATENTS.

Gas-Furnaces.—No. 107,264.

DAVIS, H. N., and TWIGG, W. R., of Luton.

No. 9545; July 6, 1916.

In carrying out this invention in gas-fired furnaces for heating steel billets or ingots, crucibles, or the like, the patentees provide a vertical one of cylindrical shape with an inner combustion chamber adapted to surround the billets or crucible, and having walls converging by steps or tapering towards their upper end—thus giving the chamber a substantially frusto-conical form. The furnace is fired with a self-supporting combustible mixture fed through a tangential opening in the furnace at the lower or enlarged end of the combustion chamber. The billets or ingots are arranged slightly above the floor level, so as to leave a space between them and the inner converged wall of the chamber—an arrangement which causes the products of combustion in rising to be forced inwards towards the centre as they rise and until they escape from the upper end of the combustion chamber through the relatively narrow annulus left between the billet and the upper end of the chamber.

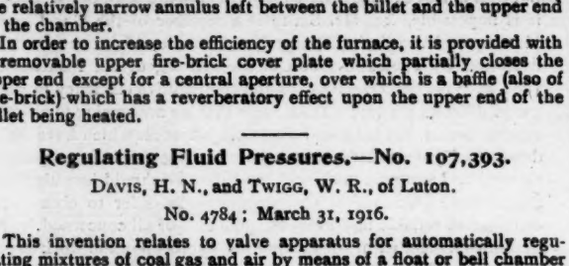
In order to increase the efficiency of the furnace, it is provided with a removable upper fire-brick cover plate which partially closes the upper end except for a central aperture, over which is a baffle (also of fire-brick) which has a reverberatory effect upon the upper end of the billet being heated.

Regulating Fluid Pressures.—No. 107,393.

DAVIS, H. N., and TWIGG, W. R., of Luton.

No. 4784; March 31, 1916.

This invention relates to valve apparatus for automatically regulating mixtures of coal gas and air by means of a float or bell chamber actuated so that increases in the pressure of one fluid produce proportionate, but greater, increases in the pressure of the other fluid—the apparatus being so loaded that the ratio of the pressures of the two fluids is not maintained constant or uniform, but automatically varies as the pressures increase.



Davis and Twigg's Fluid Pressure Regulator.

A sectional diagram of one form of apparatus in accordance with the invention is given. It shows a self-loading governor comprising an inverted bell A, having two depending concentric flanges or sides adapted to dip into liquid seals B and C, one of which seals a chamber D on the upper or outside of the bell, and the other a chamber E on the inner or under side. The intervening annular space F between the two sealing flanges is open to the atmosphere. Attached to the bell is the spindle G, of a balanced double-seated or other suitable valve H H1, through which the air passes as indicated by the arrows I. The static pressure of the air after passing this valve is allowed to exert itself on the underside of the bell chamber E. The static pressure of the gas, the path of which is indicated by the arrows J, acts upon the upper or outside bell chamber D. Thus the whole upper surface of the bell is subjected to the depressing effect of the gas pressure while only the inner underside surface of it is subjected to the elevating pressure of the air after passing through the valve, and that part of the under surface of the bell between the two depending concentric flanges is exposed to atmospheric pressure.

Consequently, the area B depressed by the gas pressure will be greater than the area A supported by the air pressure—the relative areas being dependent upon the relative diameters of the concentric flanges on the bell. For instance, assuming that the area of the bell is 1·5 times the area of the bell within the inner flange, and that the bell when atmospheric pressure is acting in the outer gas-chamber D is balanced by an air pressure in the air-chamber E of 5-10ths W.G., then if the gas pressure in the chamber D on the top of the bell is 10-10ths, the additional pressure necessary in the chamber E beneath the bell to counteract this is 15-10ths. Therefore, the total air pressure necessary to support the bell will be 15-10ths + 5-10ths = 20-10ths. Now assuming that the gas pressure rises to 20-10ths, the supporting pressure beneath the bell will then have to be 30-10ths + 5-10ths = 35-10ths. It will thus be seen that a rise of 10-10ths in the gas pressure will result in a rise of 15-10ths in the air pressure, or a rise in the air pressure of 1·5 times the rise in the gas pressure.

In the construction shown, the gas-chamber D is formed by a casing K provided with inlet and outlet connections L and M, while the chamber E is formed by a casing N also provided with similar inlet and outlet connections O and P.

Utilizing the Waste Heat of Gas-Engines, &c. No. 107,443.

SEMMLER, C., of Wiesbaden, Germany.

No. 10,403; July 24, 1916.

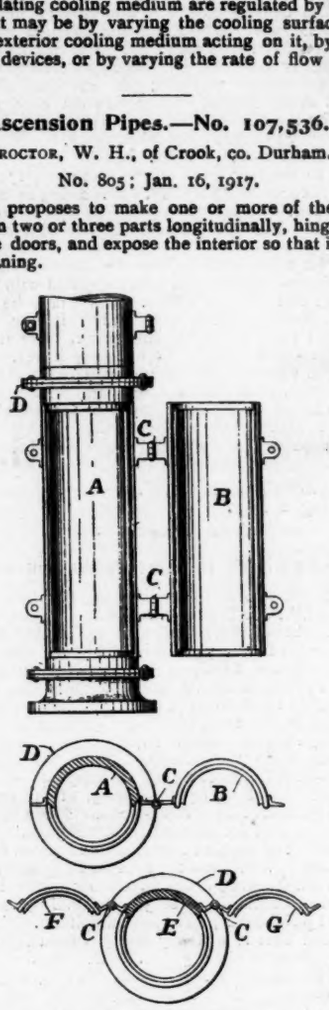
The claims for this invention are: 1.—A method for the utilization of the waste heat of gas-engines, or the like, according to which a circulating heat-conveying medium that does not readily boil, is heated without being subjected to additional pressure to a temperature below that at which it boils, and by this means, without itself evaporating, is rendered capable of heating in that part of the circuit at which heat is given off, either of generating steam or heating air to such an extent as to render them capable of performing work in extraneous apparatus. 2.—A form of carrying out the method according to which there is interpolated in the circuit a heat storage or accumulating plant for the reception of the hot cooling liquid, in order to balance the variations of temperature, due, on the one hand, to the irregular supply of heat and, on the other, to the varying amount of energy consumed. 3.—A form of carrying out the method according to which the limits of temperature of the circulating cooling medium are regulated by the amount of heat given off—it may be by varying the cooling surface or the temperature of the exterior cooling medium acting on it, by interpolating heat-dissipating devices, or by varying the rate of flow of the cooling medium.

Ascension Pipes.—No. 107,536.

PROCTOR, W. H., of Crook, co. Durham.

No. 805; Jan. 16, 1917.

The inventor proposes to make one or more of the lengths of an ascension pipe in two or three parts longitudinally, hinged together so as to open like doors, and expose the interior so that it is readily accessible for cleaning.



Proctor's Ascension Pipe.

An elevation is given of an ascension pipe divided into two parts, with the movable part thrown open; also a sectional end view. There is also a similar end view of a pipe divided into three parts.

The part A is supposed to be fixed, while B is turnable about vertical butt hinges C formed on lugs projecting radially from the sides of A B. On the outer sides are also radially projecting lugs adapted to be clamped together in pairs when the pipe is closed by screw bolts and nuts passed through holes or by some other suitable fastening. The rims of the two parts are reciprocally rabbeted, so that a beading on one rim fits into a groove in the other, and a convex rim into a concave recess. The sides of these grooves and beadings are slightly rounded, so as to allow for the circular sweep of the turnable part. The ends of the fixed part A have complete extensions, which carry flanges D adapted to be bolted to flanges of the adjoining lengths of pipe.

The description of the two-part form will, with obvious modifications, apply also to the case of the pipe divided into three parts. The turnable parts F G are connected with the fixed part E by hinges, and their opening sides are brought together when closed and the lugs clamped together as described.

LEGAL INTELLIGENCE.

WILTS COUNTY GAS COMPANY LIQUIDATION.

The issue of the report [reproduced on p. 199 of last week's "JOURNAL"] of the Official Receiver under the liquidation of the Wilts County Gas Light and Coke Company, Ltd., of No. 14, Victoria Street, S.W., and Pewsey, Wilts., was followed last Wednesday by the statutory meetings, at the offices of the Board of Trade, of the creditors and shareholders interested.

The statement of affairs showed a total deficiency of £12,641, which was accounted for as follows: Rent, salaries, law costs, &c., £1039; Directors' fees, £595; dividends paid, £968; depreciation of property, £238; preliminary expenses, £1996—all of which have been written off in the Company's books. But in addition to this, the followlng items were brought into the account, which have not been written off in the books: Depreciation on property, £6652; and preliminary expenses, £1996.

After dealing with the proofs of debt lodged, the Official Receiver said the creditors and shareholders had already received a copy of his report on the case. It was not very nice reading, and no doubt most of them knew more about the Company than he did himself. It was the same story that he had met with in other cases in which small gas-works had been acquired at a low price, and then passed on to a company at an enormous profit. In every case that had come under his notice, there had been intermediaries, who received the profit derived from the promotion. He had not looked sufficiently into the case to know whether the profits made by the intermediaries had been properly disclosed to the shareholders, and whether the shareholders had consented to the profits being paid. It might be necessary to bring some claims against the promoters of the Company in regard to these profits. With regard to the debenture for £500, the bank's claim on it was only £81; and therefore there should be over £400 accrue to the estate from this source. He had been told by Mr. Judd, the Receiver, that the £500 would be forthcoming, because it was due from a rather better gas company than the present one. The point for the Liquidator to consider was whether he should take action against the promoters for a portion of the profits they had made out of the flotation; but, of course, he would be advised by Counsel before taking proceedings.

After further discussion, it was decided to leave the winding-up of the Company in the hands of the Official Receiver.

BIG HAUL OF GERMAN DYE PATENTS.

Something like 125 applications have now been made for licences to use German patents for coal-tar dyes. The most recent application was on Thursday last, when the Morton Sundour Fabrics, Ltd., of Carlisle, applied in the Patents Court for licences to use 29 of these patents. At the beginning of June, the same firm applied for licences to take eighteen other German patents of the same class. The patents are all of the anthracene series, including several intermediate products. Nine of these patents were lately applied for by British Dyes, Ltd., who have asked for, in all, between fifty and sixty German dye patents; while Messrs. L. B. Holliday & Co. have sought permission to use nineteen.

Mr. *A. H. Davies*, M.Sc., the Chief Chemist to the Morton Sundour Fabrics, Ltd., explained that the patents, as to fourteen or fifteen of them, were post-war issues belonging to the years 1914 and 1915, and gave better and up-to-date methods of manufacture. They were mainly for vat dyes; and in the field in which the Morton Sundour Fabrics, Ltd., were interested, the whole of the serviceable German productions had now been examined.

Mr. *James Morton*, a Director of the Company, stated that the dyes would be made by the Solway Dyes Company, of Murrell Hill Works—an offshoot of the applicant Company, established at the beginning of this month to take over their dye-making section. They were the first to make in this country the blues, yellows, browns, &c., of the indanthrene series and alizarine sapphirole.

The patents in the group now applied for belong to the Badische Anilin und Soda Fabrik, Leopold Cassella & Co., Akt. Ges. für Anilin Fabrikation, Meister, Lucius, and Bruning, and the Chemische Fabrik Griesheim-Elektron.

The CONTROLLER OF PATENTS (Mr. Temple Franks) said he thought the licences should issue. The royalty would be, as before—2½ p.ct. on the completed product, and 1 p.ct. for the intermediates. It was desirable that the applicants should proceed with their manufacture at the earliest possible moment.

Lights at a Gas-Works.

The Hythe Bench last Tuesday dismissed a summons by which Mr. C. Towers, the Manager of the Hythe Gas Company, was accused of failing to subdue certain lights at the works. The light, it was said, came from the retort-house, which faces north, so that the flare could be seen from the sea. For the Company, Mr. Drake said the light came from the retort-house at times when the retorts were being charged and drawn. The Company used every conceivable means for ensuring that there should be no light showing, and no light did show towards the sea on the south or to the east or west. If the Bench convicted defendant, it would mean that gas production would be reduced by quite 50 p.ct., for the Company would have to stop making gas at night. When warnings were given, the gas-works was the first to be informed; and all lights were instantly extinguished and the work of production suspended. The Company did every possible thing that could be done; and the work had, moreover, gone on under the same conditions ever since the commencement of the war. Apart from Hythe, no gas company in England had ever been summoned for showing lights when the retorts were being drawn, with one exception. The exception was the Aylesbury Gas Company. But in that case, the work was alleged to have been continued after warning had been received in the town. It was necessary this work should proceed, as the bye-products were required for Government purposes; and it was only on the day preceding the Court that the Minister of Munitions was urging that all carbonizing plants at gas-works should be worked to the fullest extent, before any water gas, carburetted or uncarburetted, was manufactured. If the Bench convicted Mr. Towers, and thereby the Company, it would be impossible to carry on a work so important.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following report of the Directors (signed by the Chairman, Mr. Charles Hunt) will be presented at the half-yearly meeting of the proprietors next Friday.

For the third time since the commencement of the war, it has become necessary to raise the price of gas, this time by 3d. per 1000 c.ft. as from the meter-readings for the Midsummer quarter. The dividend payable under the sliding-scale will thus be reduced to £4 6s. 8d. p.ct. per annum, and the bonus to co-partners will disappear, since under the existing bonus scale this ceases when the price of gas governing the dividend exceeds 2s. 11d. per 1000 c.ft.—such price being now 3s. 1d.

The net revenue account shows that, including the balance of £13,681 brought forward from last half year, and after providing for debenture and other interest, the amount available for dividend is £41,981, out of which the Directors recommend the payment of statutory dividends (less income-tax) as follows: On the 5 p.ct. preference stock, 5 p.ct. per annum; on the 5 p.ct. ordinary stock, £4 16s. 8d.; on the 5 p.ct. West Kent ordinary stock, £4 16s. 8d.—leaving to be carried forward to next half year the sum of £14,193.

The exceptionally severe and prolonged winter, followed by continued scarcity of house coal, greatly stimulated the consumption of gas for heating and cooking. To this is mainly due the very notable increase of 17·1 p.ct. Coke sold well throughout the half year at previous prices. Ammonia products were all disposed of for home consumption. There was, and continues to be, an improved demand for tar.

Consequent upon the great increase in the output of gas and depletion of stocks, arrangements have had to be made for a much larger supply of coal during the current year than usually suffices. This has been a matter of grave difficulty. But enough has now been secured, subject to the approval of the Coal Controller.

The Directors have felt it incumbent upon them to protest strongly against the action of the Beckenham Urban District Council in charging upon the rates a deficiency incurred in the working of their electricity undertaking, and thus introducing—as regards this Company—rate-aided competition in a most objectionable form.

The Board of Trade have declined to accede to the application referred to in the last report, to extend the existing calorific power standard to the remaining one-fourth of the Company's gas supply, which continues to be governed by an illuminating power standard.

The accounts accompanying the report show that the total capital expenditure at the close of the half year (including the nominal amount added by conversion) was £1,416,395, or £29,690 more than the receipts—viz., £1,386,705, inclusive of the premium capital. A sum of £7117 was expended on capital account in the half year. The revenue from the sale of gas was £206,173; the rental of meters, stoves, and fittings produced £21,354; sales of residuals, £72,115; and the total receipts were £299,802. The following were the principal items of expenditure: Gas manufacture, £201,621; distribution, £31,002; management, £8246; rent, rates, and taxes, £10,049; and miscellaneous items bringing up the total to £269,476. Among the last-named items is an amount of £1261 charged on account of the co-partnership scheme, and another of £14,314 for war fund bonus and allowances The balance carried to the net revenue account amounts to £30,326, and there is available for dividend £41,981.

The statements as to working show that, under the supervision of Mr. S. Y. Shoubridge, the Engineer, 99,878 tons of coal were carbonized and 482,685 gallons of oil used in the half year. The quantity of gas made was 1,496,635,000 c.ft. (308,133,000 c.ft. of oil gas), of which 1,356,530,700 c.ft. were sold and 1,372,044,600 c.ft. accounted for. The residuals made were: Coke 62,423 tons; breeze, 27,382 yards; tar, 1,008,833 gallons—the make of sulphate of ammonia being 951 tons.

Alluding to what is the "objectionable rate-aided competition" referred to in the report, "The Times," in their City Notes on Thursday, said: A pertinent point is raised in the report with regard to municipal competition. The Beckenham Urban District Council is charging upon the rates a deficiency incurred in working its electrical undertaking, and is thus introducing, as regards the Company, rate-aided competition in a most objectionable form. The Beckenham Council has apparently been charging for its electric supply less than it costs to produce; but the proper method of making good the loss would have been to increase its charges. The Directors have quite rightly protested against the action of the Council.

The Demand for Gas-Stoves.—In the August War-Time Markets Reports from correspondents of the "British Trade Review," it is stated that a feature of note is the extraordinary request from cookery centres for gas stoves and fittings—so much so that the supply is not equal to the demand.

TOTTENHAM LIGHT, HEAT, AND POWER COMPANY.

In the report which will be submitted at the forthcoming meeting, the Directors state that the profit for the six months ended June 30, after providing for interest and all other charges, is £18,535. This sum, together with the amount of £682 brought forward from the previous half year, leaves available £19,217. The price of gas was advanced by 8d. per 1000 c ft. at Lady-day, to meet the increased cost of coal and oil. The Directors recommend the payment of the full statutory dividends of 5 p.ct. per annum on the preference stock, 5½ p ct. per annum on the "A" stock, and 4 p.ct. per annum on the "B" stock—all less income-tax. This will absorb a sum of £14,751, and leave £4466 to be carried forward.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £190,626; rental of meters, stoves, &c., and the maintenance of incandescent mantles produced £32,390; residuals yielded £44,314; and the total receipts amounted to £267,727. The principal items of expenditure were: Manufacture, £176,800; distribution, £29,362; management, £6627—the total expenses being £236,487. The balance carried to the net revenue account is £31,454 (included in this item is £214, the balance brought from the electricity revenue account); and the total standing at the credit of this account is £32,136. The statements relating to manufacture show that in the half year 1,405,128,000 c.ft. of gas were made, and 1,314,023,000 c.ft. sold; the total quantity accounted-for being 1,336,666,000 c.ft.

NEWPORT (MON.) GAS COMPANY.

Moving the adoption of the report and accounts at the half-yearly meeting of the Company, Mr. George Geen (the Deputy-Chairman) said there had been a remarkable increase in the sale of gas. In fact, the demand during the past six months had been the greatest in the Company's experience. As against 193,800,000 c.ft. sold in the June half of 1916, the present accounts showed sales to the extent of 217,250,000 c.ft., which was an increase of 12 p.ct. The satisfactory feature of this improvement was its universal nature. Not only had munition works and the accompanying canteens taken their share, but factories, business houses, and private houses had all alike contributed to the increased demands upon the gas output. On the other hand, the cost of manufacture had never been so heavy. The Company still had to bear, in common with similar undertakings, the extra advance of 2s. 6d. per ton in the price of coal applicable to the district of South Wales and Monmouthshire, and to no other part of the kingdom. When it was borne in mind that this extra price alone added 2½d. per 1000 c.ft. to the working expenses, the measure of this special burden would be at once apparent. Though the accounts indicated an increased volume of trade, the profits were less by £1800. The balance of £1789 brought forward from the December half year was increased by the present revenue balance of £7041, making available for the debenture interest and the statutory dividend the sum of £8830. The Directors therefore recommended the payment of this interest and statutory dividend. The Company, in common with many others, had responded patriotically to the country's call, submitting loyally to the Government's financial control of prices. In this regard, the testimony of the Right Hon. Lord Moulton, at the annual meeting of the Institution of Gas Engineers, was worth recording. He said it was the gas industry which had supplied the country with the means of defence, and that without it it would have been impossible for the country to have waged the campaigns of the last three years, or even but for a trifling time to have resisted the overwhelming flood of enemies that was poured upon it. They, as shareholders, could only hope that the Government would not lay too much on their shoulders. In conclusion, he paid a high compliment to the work done by the Secretary (Mr. T. H. Hazell), the Engineer (Mr. Thomas Canning), the Manager (Mr. J. H. Canning), and the staff. Great credit was reflected upon all.

The report was adopted; and the Chairman, Directors, and staff were cordially thanked for their services.

THE SLIDING-SCALE AND ITS REVISION.

The following remarks on the need of a revision of the sliding-scale to meet the altered conditions, as compared with those existing at the time it was fixed, appear in the August issue of the "South Metropolitan Gas Company's Co-Partnership Journal."

The National Gas Council will earn the gratitude of all gas shareholders if it succeeds in persuading the Government to do something to rectify the injustices from which companies suffer in consequence of the sliding-scale being based on dead-and-gone market conditions. Our Company's scale was fixed about seventeen years ago, and was arranged so as to give the Company an inducement to effect economies in working. If prices were now what they were then, the shareholders would be getting a very fair reward for the improvements in manufacture and the enterprise in management which have marked the present century. But coal, freightage, wages, taxes, and half-a-dozen other matters more than neutralize the good results of efficient management; and the shareholders and co-partners have to suffer for the benefit of the consumers. Mr. Balfour Browne has called attention in a recent book to the obvious fact that the market price of raw material is likely to be a more uncertain factor than efficiency of working; and, in common fairness, there should be some simple means of adjusting sliding-scales to suit the economic conditions over which the Company have no control. It might be arranged for these scales to be modified from time to time by the Board of Trade, on the application of the Company or of some competent public authority.

Whitworth Vale Gas Company.—There is reported by the Company a profit for the past half year of £338. The disposable balance is £974, out of which the Directors recommend the payment of a dividend of 5 p.ct. on the original and "B" shares, less income tax.

SULPHATE OF AMMONIA PRODUCTION IN 1915-16.

The Barrett Company's (New York) Statistics.

In furnishing particulars of the world's production of sulphate of ammonia for the years 1915-16, the Barrett Company, of New York City, point out that statistics of an accurate character are difficult to obtain. There are none available from Belgium; and the figures for Germany and Austria can only be considered as unofficial estimates, whose dimensions are surprising. As to sources of production, it is pointed out that a new process for the fixation of atmospheric nitrogen, which produces sodium cyanide and (upon further treatment) ammonia, has been put forward by Prof. John E. Bucher. Coke, sodium carbonate, and iron borings are raised to a red heat in an atmosphere of nitrogen or producer gas; and sodium cyanide is formed. By boiling with caustic soda, ammonia is readily obtained. While only in the experimental stage as yet, it is understood that an operating plant is being erected; and a nitrogenous product of some character will be placed on the market before long. Research on these lines has been much stimulated; and numerous other processes for nitrogen fixation have been brought to notice. From a commercial point of view, the years 1915 and 1916 have displayed a practically continuous rise in price, to heights that have not been reached for many years.

Production in the United States.

In the United States, it would appear that the long-expected swing towards the bye-product coke-oven was at last taking place. The production for 1916 is estimated at 325,000 tons—an increase of 75,000 tons over the figures for 1915, or 30 p.ct. Of this production, 272,000 tons are credited to the coke-ovens and 53,000 tons to the gas-works and bone-carbonizing plants. The corresponding figures for 1915 were 197,128 tons for the coke-oven plants and 51,921 tons for the gas-works—a total of 249,049 net tons. To this amount should be added 1000 tons estimated for the recovery of sulphate of ammonia from bone carbonization, &c. So the total figure for the year 1915 would be 250,049 net tons, reckoning all forms as sulphate. The increase of 75,000 tons output in a year is a notable one; but it is scarcely larger than Germany recorded in 1912, when the coke-making industry of that country was being transformed from a non-recovery to a recovery basis.

The total coke production in 1916 was a record breaker, both for beehive and bye-product ovens, amounting to over 54,000,000 tons. This corresponds to about 82,300,000 tons of coal; and taken together with the gas-works carbonization, some 4,700,000 tons, we may place the coal carbonized at 87,000,000 tons for the year. This should have yielded 870,000 tons of sulphate of ammonia, if treated in bye-product ovens, in place of 325,000 tons, the estimated recovery. In other words, only 37 p.ct. of the possible recovery is being effected. If we base the production on coke produced rather than on coal carbonized, we may take the total coke from all sources in 1916 at about 57,270,000 tons, and that from recovery ovens and gas-works at 22,100,000 tons. The bye-product coke is then 38·6 p.ct. of the total.

The consumption of all forms of ammonia, reckoned as sulphate, in the United States was 315,424 tons in 1915 and 347,708 tons in 1916; the increase in home production in 1916 being partly offset by loss in imports. Both consumption figures show substantial increases over the year preceding.

The United Kingdom.

According to the report of the British Alkali Committee, the production of sulphate of ammonia and equivalent in the United Kingdom in 1915 was 426,267 gross tons, practically the same as in 1914. The figures for 1916 are not yet available; but the estimates prepared by Messrs. Bradbury and Hirsch show 438,000 tons for the year—an increase of 12,000 tons.

Apparently the gas-works production fell off about 2200 tons, which was not surprising under the circumstances; but the estimates indicate that 1916 has made up the loss. The other items—namely, iron-works, shale-works, and producer gas and carbonizing works—are about the same, except that the coke-oven output has gained 8000 tons in 1915 and presumably as much or more in 1916. The estimates for 1916 bracket the coke-ovens with the producer gas and carbonizing output, and show an increase of 12,000 tons, probably due to the coke-ovens, although recent installations of recovery producers may have shared to some extent. The consumption for 1915 was 131,000 gross tons, including agriculture, ammonia soda, and munitions uses, which is 25,000 tons more than was used in 1914, but less than the estimate for 1916—178,000 tons. This increase is largely due to the manufacture of explosives in both years; although no exact data are available on this point.

The average price of the 24 p.ct. grade at Hull for 1915 was £14 8s. 1d., and for 1916 £17 7s. 8d. per ton. The first is £3 1s. more than for 1914, and the second is an increase of £2 19s. 7d. over 1915. Both are the highest prices since 1884. Indeed, the 1916 average has not been equalled since 1882. At the same time, nitrate of soda has been selling at approximately the same price per ton, and at times even higher

Production in Germany.

There are no figures of an official nature available for the ammonia production of Germany since those for 1913. What data we have, however, as well as the logic of circumstances, lead us to the belief that the 1913 production figure of 548,560 tons has been largely exceeded under stress of war conditions. An article printed in May, 1916, in the "Frankfurter Handelsblatt," makes some statements that are of interest in this connection.

The following particulars give an idea of the extraordinary rapidity with which the Haber process has developed. The capacity rose from 30,000 tons in 1913 to 60,000 tons in 1914; and about the middle of 1915 the output of the original works was about 150,000 tons. For 1916, the production is reckoned at 300,000 tons. It is no secret that the Badische Company have lately put up further large plants in another part of Germany; so that its producing capacity for 1917 will no doubt be considerably in excess of 1916. Assuming that the Haber production in the near future will reach 500,000 tons, this process alone will represent the production of an amount of nitrogen

World's Sulphate of Ammonia Production.

(In metric tons of 2204·6 lbs.)

Country.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.
England	294,170	318,400	330,450	354,747	373,590	391,160	394,540	439,565	433,259	433,011	445,033
Germany	235,000	287,000	313,000	330,000	373,000	418,000	492,000	548,558	..	..	..
United States	68,000	90,120	79,500	96,600	105,143	115,245	149,700	176,900	166,016	226,834	294,838
†France	49,100	52,700	52,600	53,600	56,000	60,000	68,500	74,500	..	42,000	25,000
†Belgium and Holland	30,000	*55,000	§35,000	§40,000	§43,000	§43,000	§55,800	§53,600	5,000	5,000	4,000
†Spain	10,000	‡12,000	..	12,000	9,000		§9,000	§15,000	15,000	15,000	16,000
†Italy	5,000	11,000	§80,000	12,000	12,000	§166,500	§15,000	§15,000	14,323	15,000	..
†Other Countries	40,000	65,000	..	§73,000	§79,000		¶68,800	¶86,100	..	..	..
Total	731,270	891,200	890,550	971,947	1,050,733	1,193,905	1,253,340	1,409,223			

* Including Norway, Sweden, and Denmark. † Estimates from l'Engrais. ‡ Including Portugal.
§ Estimates from Deutsche Ammoniak-Verkaufs-Vereiningung, 1908-9-10-11-12-13. ¶ Estimated.

nearly equal to the amount of nitrate of soda we used to import. In passing, it may be mentioned that such a production at a price of $60 per ton would represent an annual turnover of $30,000,000 for this one firm.

In addition, further large quantities of nitrogen have been produced with state aid in the form of cyanamide, with the aid of which German agricultural needs can easily be met. Furthermore, the whole tendency in the coal industry has been towards the increase of bye-product ovens. Up to the time when the war broke out, about one-fifth of our coal was coked; but the war has forced resort to coking to a far greater extent than before. Everything points to the conclusion that in the near future the direct combustion of coal will be recognized as altogether uneconomic and disappear, and its place be taken by bye-product processes. This, of course, means increased recovery of ammonia from coal. Assuming that only double the quantity of coal hitherto used is employed for the recovery of ammonia, the increase in sulphate of ammonia production amounts to 450,000 tons. Based on the above, the following comparison between 1913 and 1917 can be made:

German Consumption of Nitrogen, 1913, in Metric Tons.

Sulphate of ammonia	460,000 tons	—	92,000	tons nitrogen
Norwegian nitrate of lime	35,000 ,,	—	4,500	,, ,,
Cyanamide	30,000 ,,	—	6,000	,, ,,
Ammonia—Haber process	20,000 ,,	—	4,000	,, ,,
Total			106,500	,, ,,
Plus nitrate of soda	750,000 ,,	—	116,000	,, ,,
Grand total			222,500	

German Production of Nitrogen, 1917, in Metric Tons.

Sulphate of ammonia	700,000 tons	—	140,000	tons nitrogen
Norwegian nitrate of lime	.. ,,	—	..	,, ,,
Cyanamide	400,000 ,,	—	80,000	,, ,,
Ammonia—Haber process	500,000 ,,	—	100,000	,, ,,
Total			320,000	,, ,,
Nitrate of soda			None	

If these statements are only approximately correct, our own production will already next year be greater than our consumption before the war, including the amount of nitrate of soda imported. In case of need, therefore, we can altogether do without the importation of nitrate of soda for agricultural purposes. This does not mean, however, that the import of nitrate of soda is either unnecessary or undesirable. Nitrate will remain very much wanted for certain purposes; and agriculture will be glad to make use of it as long as prices remain competitive—especially in view of the amount of German capital invested in the Chile nitrate industry.

How close the actual figures for 1917 will come to these estimates, and how much of the enormous capacity claimed will be effective when the war is over, it is of course impossible to say. The statements regarding the increase in bye-product coking and in the use of coke are interesting, especially as there is reason to think that the coke-plants can be operated economically in times of peace.

The proposed nitrogen monopoly, by which the production of Germany was to be protected for a seven-year period to offset the cost of war construction and operation, appears to have been definitely abandoned. Some of the new plants, it is stated, have however received considerable financial assistance from the Government.

FRANCE.

The production of sulphate of ammonia in France has fallen off in 1916 to 25,000 tons, only one-third of the 1913 output. The figures for the last two years are given on the authority of the Comptoir Français du Sulfate d'Ammoniaque. Details as to source are not available; nor is there any estimate for 1914.

JAPAN.

The imports into Japan from England have been very low compared with previous totals—amounting to 10,537 tons in 1915 and 9155 tons in 1916. The total imports into Japan and the amounts received from Great Britain, according to the official Japanese commercial statistics, are as follows:

	1913.	1914.	1915.
Imports from Great Britain	108,243	103,760	17,806
Total imports	110,635	104,794	19,195

So far as these figures go, it would appear that Japan imports practically her whole supply from Great Britain. The 1916 data are not yet available.

RUSSIA.

Russia has been making forward strides in sulphate of ammonia production; the principal source being the bye-product coke ovens in South Russia. The figures, which have hitherto been included in the table of world's production with those of other countries, are as follows; 1911, 524 tons; 1912, 4013 tons; 1913, 13,089 tons; 1914, 17,167 tons; 1915, 16,380 tons.

In the year 1916 it was reported that the production would amount to 32,760 tons, because of the increase in coke-oven capacity, largely in the vicinity of Kharkoff. It is also stated that the stocks on hand at the plants at the close of 1915 were considerable, amounting to 24,570 tons, which would make the estimated supply for 1916 amount to 57,332 net tons. The home consumption of sulphate of ammonia is small, Chilean nitrate having been used for fertilizer purposes until the outbreak of the war. Since then it has been used more freely.

CHINA.

According to the Chinese Year Book for 1916, the output of sulphate of ammonia in 1915 was about 4000 tons; and an increase to 10,000 tons in 1916 seemed probable. The product was said to be marketed in Japan.

AUSTRALIA.

The production of sulphate of ammonia in Australia is given by the Ammonia Company of Australia, as follows: 1913, 5487 tons; 1914, 5741 tons; 1915, 6503 tons; 1916, 7214 tons.

OTHER COUNTRIES.

The production of Holland, hitherto combined with that of Belgium in the table of world's production, is given as 7000 tons in 1913, 5000 tons in 1914, 5000 tons in 1915, and 4000 tons in 1916. The imports were 47,647 tons in 1914, and 33,900 tons in 1915; while the exports, which were 31,183 tons in 1914, dropped to 76 tons in 1915.

Sweden produced 1377 tons in 1913, 1510 tons in 1914, 1200 tons in 1915, and 1000 tons in 1916.

COAL PRICES AND COST OF GAS IN AMSTERDAM.

[From a Dutch Correspondent.]

One of the means adopted for securing economy in the use of gas in Holland has been a system of imposing additional charges for all quantities of gas consumed above certain limits. The Amsterdam Municipal Council have, however, in spite of opposition, decided to abolish the additional charges, and instead to raise the price of gas in proportion to the enhanced cost of manufacture. Until now, the normal figure has been at the rate of 3s. 4d. per 1000 c.ft., and 3s. 7d. for prepayment consumers. But the considerable rise in coal prices, and therefore in the cost of manufacturing gas, rendered these charges unprofitable, with the consequence that it was proposed (and agreed) that the Municipal Council should raise the price of gas to 4s. 9d. and 5s. per 1000 c.ft. respectively.

A report dealing with the matter gives some information with regard to the cost of gas production. In the first quarter of 1917 the loss amounted to £2708; and that this figure was not higher was due chiefly to the additional charges for quantities consumed above the limits fixed. These extra charges amounted to £21,510; so that, reckoning the whole of the consumption at 3s. 4d. per 1000 c.ft., the total loss would have been £24,218. As a matter of fact, the cost price of the gas during the first quarter was 4s. per 1000 c.ft.; the average price of coal being 36s. 3d. per metric ton—calculated on the remaining stock of coal from the previous year, and the supplies received during the three months. For the second quarter of this year, the price of coal equalled 41s. 8d. per ton, which increased the manufacturing cost of gas to 4s. 4d. per 1000 c.ft. With the old gas rates, this gives a loss in the working results of £9666 for the quarter alone. Inasmuch as in the third and fourth quarters coal prices must be reckoned at 43s. 4d. per ton, the cost price of the gas is likely to rise to 4s. 7d. per 1000 c.ft. Therefore, if the old gas price were maintained, a loss of £50,800 might be expected. With, however, at the beginning of July, the price increased to 4s. 9d., the average revenue will amount to 4s. 10d. per 1000 c.ft., in which case a net profit may be looked for of £15,866 for the second half year. Deducting the loss incurred during the first half year, the net results for 1917 would thus be a profit of £3492.

In the above estimates for the second half year, a gas oil price of £12 10s. per metric ton was included; but in the meantime the price has increased to £23 6s. 8d. per ton for a supply of 1100 tons. This addition to the cost of carburetting will render the net profit referred to altogether illusory, and convert it into a loss of £8425.

A Large Dye Combination in America.—The National Aniline and Chemical Company has lately been inaugurated at New Albany (N.Y.), with a capital comprising 200,000 7 p.ct. preference shares of £20, and 350,000 ordinary shares carrying no fixed face value. It is an amalgamation of several concerns; and as the whole of the capital has been taken by the constituent undertakings, in exchange for their properties, a public issue of shares is not contemplated. The avowed object is to supply all American requirements, by the manufacture of coal-tar dyes and intermediates that will successfully compete, both in regard to quality and variety, with those hitherto imported, and the permanent elimination of Germany as the chief source of colours in the home market. Important extensions of plant are in view.

A LOWER HEAT STANDARD ASKED FOR NEW JERSEY, U.S.A.

It is reported by the "American Gas Engineering Journal" that the Public Service Gas Company, of New Jersey, and a number of smaller gas concerns petitioned the State Public Utilities Commission for a readjustment of the gas standard which has been in force in New Jersey since Oct. 17, 1911. The Public Service asked that, if the standard is not lowered, it be allowed to increase its rates. The Board held a public hearing on the applications on the 19th ult.

The Public Service in its petition did not suggest any new standard to take the place of the one now existing. It stated that, since the standard was fixed in 1911, the conditions surrounding the manufacture of gas have materially changed; and it is now almost impossible to maintain the standard and manufacture gas profitably. The smaller companies which petitioned recited that during the last two years the costs of coal, coke, and oil—the main elements in gas-making—together with the cost of labour, had increased to such an extent that a condition exists whereby the gas companies must have speedy relief if they are to be saved from heavy and unmerited loss.

New Jersey requires every gas company to maintain a gas standard based on a monthly average total heating value of not less than 600 B.Th.U., with a minimum which shall never fall below 550 B.Th.U. This is materially higher than similar standards used in adjoining States; but it was fixed after exhaustive tests and experiments. The petitioners claimed that adequate service would be given if the standard was made to conform with those of other States, and at the same time the companies would be given a margin for profit because of the saving that would result in the cost of manufacture.

COAL CONCRETED FROM DUST OR ASHES.

A paper was read before the Society of Architects some weeks ago [see "Journal" for June 12, p. 530] by Mr. R. Goulburn Lovell, in which he described a process for utilizing waste material of calorific value. During the meeting it was suggested that the process of manufacture should be demonstrated, and that the analysis of the component parts and the resultant fuel should be shown. Last month, in a second paper, Mr. Lovell complied with this suggestion—remarking that his colleague, Mr. C. M. Hughes, and he were anxious to explain all that they could. They did not claim that their process increased the total thermal value of the aggregates; but they did say that there are many so-called waste materials which may be converted by this simple process into a fuel valuable for many purposes. By it, a British thermal unit costs less than that obtained by means of Nature's coal. This is the point that must appeal most strongly to the commercial mind.

There are three methods of making the fuel, which may be called A, B, and C. A and B may be termed dry processes. In this case, there are taken as aggregates ashes and coal dust. The cinder-sifter first of all plays its part by sifting the fine dust, which is of little or no value. The coarse aggregate is therefore composed of all between ¼ and ⅛ mesh. This is dried, and then sprinkled with a special sugar-waste solution, and again dried. The fine aggregate is taken from the coal-cellar dust—only that which passes ¼-in. mesh being used. These two bases should be intimately mixed with the matrix or binder. Up to this point, A process and B process are exactly the same. Process A is employed wherever the sun has much value, or where heating-chambers are available. The mixed aggregates and binder have in some cases a small quantity of creosote oil added. They are placed in moulds, and allowed to concrete; the time, of course, varying with the amount of heat available. The fuel, when cold, is emptied out of the moulds, broken up, and hardened by exposure to the atmosphere. With process B, the small quantity of creosote oil (if used) is placed in a boiler, the mixture of bases and matrix is added, and the whole is placed upon a fire and stirred until a temperature of about 120° Fahr. is obtained, when the material is emptied into a mould. In a short time it is cold, and is emptied out, broken up, and allowed to harden. Process C is a wet process, in which there is no need to dry the aggregates. They are mixed as before, but with a different matrix mixture. The creosote oil, if used, is added and well mixed. The whole is then moistened with the solution until a consistency of mortar or concrete is obtained. It is then emptied into shallow moulds, or between sheathing boards, and dried by exposure, but protected from the wet.

In all three processes the character of the matrices varies with the character of the aggregates; and the different aggregates have to be treated by different methods. This method of concreting fuel dispenses with any kind of pressure beyond a slight tamping into the moulds. Capable men are required to control the manufacture, in order to standardize, as far as possible, the qualities of the various fuels. Process A is more particularly suited to climates favoured with a succession of sunshine, or it is equally well suited to any industrial concerns having ovens or heating-chambers where the moulds and their contents could remain for twenty minutes or half-an-hour. For low-grade cokes, coals, or bar ashes, process A is the best method. Process B is suited for any form of rotary asphalt plant, either fixed or movable. Portable heaters could be taken to any dumps of coal slack, coke dust, or cinders, and very quickly transform them into a good fuel. For all materials high in carbon but low in volatile matter, process B is the best method. Process C is the cottager's method of producing coal in his own back yard. For high-grade cokes, high-grade bituminous coals, or a mixture of the latter with ashes, peat, sawdust, &c, process C is the best method. The town refuse yard, the gas-works, the brick and tile works, and other places have thousands of tons of potential coal scattered up and down the land. The individual and the firm can help the country and themselves by tackling this question now.

[The author submitted a tabulated statement of analyses of seven different types of fuel, ranging from peat to anthracite, made under the three processes, together with the calorific values of their component parts.]

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Aug.* 3.

As usual, the products markets are quiet at this time of the year. Pitch remains firm at about 45s. net per ton f.o.b. makers' works, and quantities are being shipped as tonnage is available. Creosote is nominally 4¼d. to 4½d. net per gallon, but may only be sold under licence of the Ministry of Munitions. There is nothing to report as to other tar products.

Sulphate of ammonia is being sold mostly for forward delivery, on the basis of the official prices, for home agriculture.

Tar Products in the Provinces.

Aug. 4.

There is nothing of importance to report with regard to prices for tar products, with the exception of solvent naphtha, which appears to be a little firmer.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. 3d. to 24s. 9d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s. 6d., Liverpool 16s. 6d. to 17s. 6d., Clyde 17s. to 18s. nominal. Benzol, 90 p.ct., North, 10¾d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6¾d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

COAL TRADE REPORT.

Northern Coal Trade.

The holidays have, as usual, been preceded by a fuller demand for coal. In the steam coal trade, an order for the Norwegian Railways has been booked at just about the settled prices. Best steams are near 30s. per ton f.o.b.; second-class qualities are 25s. 6d.; and steam smalls are plentiful, varying from 18s. 6d. to 20s. 6d. In the gas coal trade, the demand is fuller; but the want of steamers is felt. Best Durhams are about 25s. per ton f.o.b.; second-class descriptions are easy at 24s.; but "Wear specials" are firm at 29s. to 30s. While these are the current quotations, where a steamer can be offered for prompt loading, some discount may at times be obtained from them. It is believed that the stocks of gas coal have been increased of late. Freight is from 15s. to 16s. Tyne to London, where contracts have not been arranged. The coke trade is steady, with prices at from 29s. 6d. to 31s. 6d. f.o.b. for good gas coke. Freight on coke to Dunkirk is 45s.

Stockport Labour Troubles.

Attention was drawn by Mr. J. Winter (the Chairman of the Gas Committee), at last week's meeting of the Stockport Town Council, to the unsatisfactory attitude adopted by some of the men at the works in throwing up their jobs without notice, after the Arbitrator had given his award on the question of wages. At whatever decision the Arbitrator arrived, the men ought, he said, to have adhered to it. Their Secretary came from London and spoke to the men, and told them what the award was. They agreed with him, and actually passed a vote of thanks to him; and the next minute, when they received their wages, they put down their tools and refused to go on working. The undertaking could not be carried on if such action was repeated. The Committee did not mind the loss of a day so far as the Corporation were concerned; but at a time like this, when so many munitions works and hospitals depended for heat and lighting, and the comforts of wounded soldiers, upon a continuance of the supply of gas, such a proceeding was most unwarrantable. The recent award would make a difference of £5000 a year in bonus alone. The additional wages would swell the amount to £10,000; and the 6d. increase in the price of gas realized only about £14,000. At a time like this, the men should be more loyal to the department. The Committee had made up their minds that they were not going to tolerate such conduct much longer. The gas-works were now a certified controlled department; and if any similar action was taken by the men in future, the Ministry of Munitions had power to step in under the Defence of the Realm Act.

It has been agreed by the Burnley Town Council that there is to be no lighting of streets until Sept. 1; and instructions have been given for the necessary arrangements to be made for a resumption of street lighting for the winter.

The Lancaster Gas Committee have made arrangements to supply gas to several motor char-a-banc owners. The charge is to be 3d. per 100 c.ft. or part of 100 c.ft., with any labour costs in addition. A Sub-Committee of the Bolton Corporation are considering the question of coal gas being utilized for motor-driven vehicles, and have full authority to take such action as they deem advisable.

Why a manufacturer should establish works at Burton-on-Trent is explained in an official illustrated handbook issued by the Commercial Development Committee of the Corporation. One of the reasons given is because gas and electricity may be had on exceptionally low terms for power. A photograph of the show-rooms is included; and it is pointed out that types of the best and most modern domestic labour-saving appliances may be seen in operation there, and practical advice obtained on all questions of gas lighting, heating, and power. On a book-mark, features connected with the gas supply are indicated, and the scale of charges for gas is set out.

A Commission for a Gas Stoker.—A Bradford Corporation gas stoker, Sergeant E. Sutor, has signally distinguished himself in the army. He has done such good service at the front that, following his promotion to be Sergeant, he was sent to an officers' training battalion at Bristol, and has now been given his Commission. Second-Lieutenant Sutor has the heartiest congratulations of his fellow workers in the Bradford Gas Department.

Bo'ness Gas Light Company, Ltd.—The annual meeting of the Company was held last week, when it was reported that the profit for the year, after allowing for depreciation, amounted to £856. Including the amount brought forward, there was for disposal the sum of £1669, from which a dividend of 6 p.ct., free of tax, was declared, leaving £821 to carry forward. The Manager (Mr. James Campbell) stated that the gas made amounted to 35,857,000 c.ft., a decrease of 3·25 p.ct. It was intimated that the price of gas would remain as before, at 3s. 4d. per 1000 c.ft.

Breathing Apparatus Used in Coal Mines.—The Committee of the Privy Council for Scientific and Industrial Research, on the recommendation of their Advisory Council, and at the request of the Home Office, have sanctioned the appointment of a Committee to inquire into the types of breathing apparatus used in coal mines, and by experiment to determine the advantages, limitations, and defects of the several types of apparatus, what improvements in them are possible, whether it is advisable that the types used in mines should be standardized, and to collect evidence bearing on these points. The following have been appointed members of the Committee: Mr. William Walker, Acting Chief Inspector of Mines under the Home Office (Chairman); Mr. John Haldane, LL.D., F.R.S.; and Mr. H. Briggs, D.Sc., of the Heriot-Watt College, Edinburgh. Mr. A. Richardson has been appointed Secretary; and Dr. Henry Briggs is constituted Director of the Inquiry.

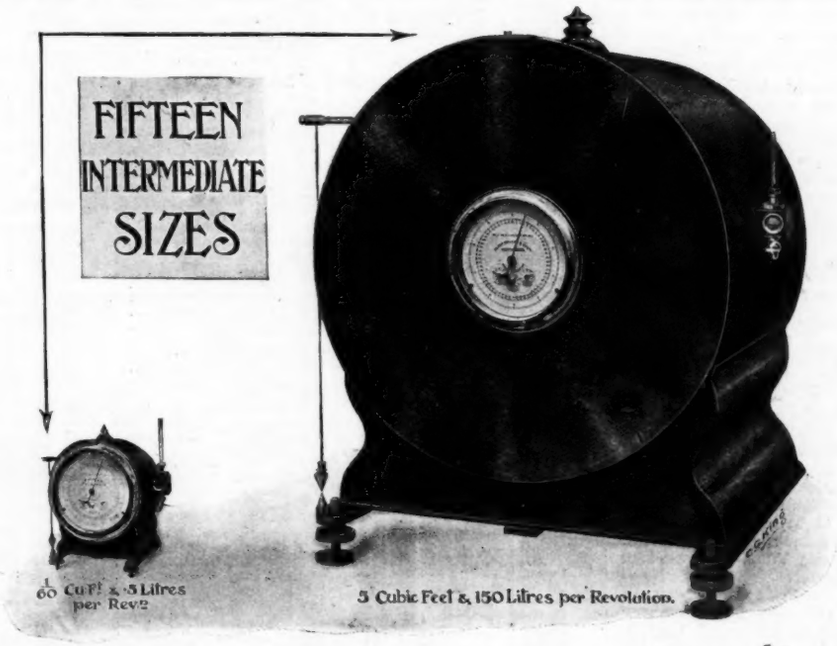
Coal Gas for Vehicles.—According to the "Commercial Motor," there are now 350 flexible gasholders fitted to commercial motors for use on the highways of the United Kingdom; and the displacement of petrol is already at the rate of 700,000 gallons per annum. "The claims of coal gas for propulsion on common roads," it is added, "have attracted much additional support during the past three months, by reason of the satisfactory experience of earlier users. If one takes the cost of coal gas so high as 4s. per 1000 c.ft., and puts the average consumption of a 3-ton lorry at 2000 gallons of petrol per annum, the use of the alternative fuel effects an economy of more than £100 in a year. If the gas can be bought so low as 2s. per 1000 c.ft., the saving will exceed £150 in a year per three-tonner. If a user is concerned with motor-bus operation, in which the daily mileages are higher than in average goods service, the economy may run to so much as £1 per vehicle per day, or even be greater than that." Blackpool and Brighton gas-driven motor omnibuses were illustrated in last Thursday's "Daily Graphic."

Leeds Wages Arbitration.—Mr. Forbes Lankester, K.C., sat at the Leeds Town Hall last Tuesday, as Arbitrator in a dispute between the Corporation and the General Workers' Union on the wages of the Gas and Electricity Department employees. The men's application was for an increase of 3s. per week on the existing advances on pre-war rates of pay, making a 10s. increase, instead of 7s. Mr. Wood, on the men's behalf, contended that the application was reasonable, when they remembered that the men worked along with members of the Amalgamated Society of Engineers, who, by a recent award, had an increase of 15s. per week on pre-war wages. Alderman C. H. Wilson, for the Corporation, urged that the ratepayers were hard pressed by war conditions, and that the claim was uncalled-for, so soon after the award to the tramway men. The men who were not tramway men, and who had received an advance of 2s. only three months ago, should be satisfied. The Arbitrator received a deputation from the workmen, and reserved his decision.

Stockport Gas-Works Deficiency.—Presenting to the Town Council the report on the past year's working of the Stockport Corporation gas undertaking, the Chairman of the Gas Committee (Mr. J. Winter) said he regretted he was not able to repeat the satisfactory statement of last year, when there was a profit of £13,958, because there had been a loss of £4432, making a difference of £18,014 in the working of the undertaking. There had been an increase in the income from residuals of £9485, of which £3572 had been contributed in the months of February and March. But against any increased income had to be set a decreased income from sales of gas. The Committee were doing all they possibly could to assist the Government in getting out as much high explosive as possible. It was unfortunate that, from an undertaking involving such a large capital expenditure, they had not been able to secure for last year a reasonable return; but, as the Council knew, the Committee had been handicapped. He hoped next year, by means of the new plant put down, to present a more satisfactory statement.

Price of Coke at Halifax.—Members of the Halifax Town Council have been discussing the price of coke, on a recommendation of the Gas Committee that after Oct. 1 the charge be increased to 25s. per ton. One member, in moving as an amendment that the price be 15s. per ton to residents in the borough, said the Commtttee's proposal would mean taking advantage of the poorest people in very hard times. Mr. J. H. Waddington (Chairman of the Gas Committee) pointed out that pennyworths of coke, weighing 14 lbs., which was only at the rate of 14s. 6d. per ton, were supplied at the gas-works to all who came for them and took them away. To-day there were only 120 tons of coke at the gas-works, compared with 2000 tons a year ago. The amendment was defeated. An amendment that no person purchasing 1 cwt. of coke should be charged more than 9d. per cwt. was also lost. Mr. Waddington remarked that the expenses at the gas-works were £34,000 a year more than they were three years ago. The increase in the price of gas brought only £9000 a year more; and the rest had to be made out of residuals.

Laboratory Meters - - -



ALEXANDER WRIGHT & CO., LTD.,

WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

Gas Price in Cavan.—The Cavan Gas Company announce that, owing to the increased cost of coal, freights, labour, &c., they are compelled to increase their price from 6s. 8d. to 7s. 1d. per 1000 c.ft.

An Appeal to the Public.—In view of the paramount importance of meeting the increasing need for bye-products obtained from the carbonization of coal at gas-works, the Minister of Munitions has, through the public Press, impressed on those who possess gas-burning appliances the desirability of using gas in preference to any other means of obtaining light, heat, or power. At present, he says, an increased supply of gas may be provided without difficulty, inasmuch as during the summer months gas undertakings generally are in a position to manufacture in excess of the ordinary requirements of consumers.

Okehampton Gas Company.—At the annual meeting of the Company, the Chairman (Mr. Seth Harry), in moving the adoption of the report, said he was very sorry the Directors had not been able to present a more favourable balance-sheet. The smallness of the net profit of the past year's trading was due to the price of coal and of everything in connection with the manufacture of gas. They had also suffered loss on account of delay in the delivery of coal by the railway company. The consumption of gas, as compared with previous years, had been somewhat less, though the coal cost more. It was decided not to declare a dividend, but to carry forward the amount available.

Burnley and the Supply of Gas Oil.—It was reported to last Wednesday's meeting of the Burnley Town Council that the Gas Engineer (Mr. J. P. Leather) had read to the Gas Committee a letter from the Anglo-American Oil Company, stating that, by order of the Petroleum Pool Board, the supply of gas oil to gas undertakings had to be discontinued, unless a certificate of the Ministry of Munitions is held permitting a supply. The Engineer also reported that, as a result of this, it would be necessary to obtain larger coal supplies. The Chairman and Vice-Chairman of the Gas Committee and the Engineer were authorized to make arrangements to secure an adequate supply of coal, and if possible of gas oil, for their requirements.

Coatbridge Gas Company.—The report to be submitted to the annual meeting of the Company states that the accounts for the year ended June 30 are satisfactory. The consumption of gas amounted to 289,328,194 c.ft., being an increase of 44,441,507 c.ft. over the corresponding period—solely due to demands for munition purposes. The gas unaccounted-for was 7·86 p.ct. The gross revenue from gas, residual products, &c., amounted to £53,419. The Directors will recommend the payment of dividends, in accordance with the sliding-scale, at the rate of 11½ p.ct. on the original stock, and £8 1s. p.ct. per annum on the three issues of £10 shares, less income-tax. It is understood that the price of gas will remain as at present—2s. per 1000 c.ft., which, along with Uddingston, is still the cheapest gas in Scotland.

STOCK MARKET REPORT.

The prevailing characteristics of markets on the Stock Exchange last week were quite favourable. The tone was always, except perhaps just at the start, as good as firm and sometimes amounting to cheerful; and this became the more pronounced up to the close. In ordinary circumstances, one might have witnessed a marked recovery in prices; but, faced as they were with a holiday closure from Friday till to-day, they scarcely had scope to develop. The great stimulating factor was the joyous news of Haig's fine achievement on Tuesday, which came abundantly welcome after a long dearth of information. The intelligence also of Russian regiments coming to their senses and their duty under Korniloff's masterful hand assisted. Thus buttressed, markets were firm.

The gilt-edged division, after a little hesitatation on the opening day, got a fair way and sailed away cheerily. Home Governments were very firm, and several of them advanced. Home Rails made a nice recovery and enjoyed a demand long denied to them. In the American Market, the chief feature was the strength of Canadian lines on the Dominion Government's decision in regard to taking over. Argentines advanced, but gave ground a little before the close. South African were steady.

The Foreign Market showed strong points; but here, too, movements became irregular. Russian were better on the whole, and French and Scandinavian were firm. There were inquiries for Dutch and Greek issues. Brazilian and Japanese were uncertain. Among the rest, Textiles and Breweries were the firmest.

Business in the Gas Market was not on the increase—in fact, had it not been for a fair array of transactions in the biggest issue, the aggregate would have been meagre indeed. Prices, on the whole, were inclined to easier figures, though there was no pronounced fall. South Metropolitan announce a full statutory dividend at the rate of £4 13s. 4d. p.ct., and South Suburban a similar dividend at the rate of £4 16s. 8d. p.ct.

In the Money Market, there was hardly any change in rates.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 68⅛, ditto debenture 55⅞, Imperial Continental 79⅜, 80, San Paulo debenture 40⅝, South Suburban 78. On Tuesday, Brentford "A" 80½, European 11, 11 1/16, Gas Light ordinary, 67⅛, 67⅜, 68, 68⅛, ditto debenture 56⅝, Imperial Continental 79, 79⅛, 80, Monte Video 8 1/16, Primitiva 36s., ditto preference 55s. On Wednesday, European 11⅛, Gas Light ordinary 67, 67⅛, 67⅜, 67⅝, 67¾, 68, 68⅛, ditto debenture 55⅛, 55⅓, Imperial Continental 80, South Suburban 77, 77⅓. On Thursday, Gas Light ordinary 67⅛, 67¼, 67⅜, 68, 68⅛, ditto maximum 55, 55⅛, Imperial Continental, 79⅜, Monte Video 8⅛, Primitiva 36s. 6d., 37s., ditto preference 56s. 3d., Newcastle debenture 62. On Friday, Bournemouth "A" 25⅛, European 11⅛, Gas Light ordinary 67⅛, 68, 68⅛, 68½, ditto maximum 55⅜, 55⅛, 56, Imperial Continental 80½, South Suburban 77, Tottenham "A" 96½.

The Bank rate is 5 p.ct., as fixed on April 5.

In view of the increase in the cost of lighting, the London County Council last Tuesday approved of an additional expenditure of £75 for seven Thames Bridges, £33 for Woolwich Ferry, and £25 for the Thames Embankments.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	...	58—63	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅝	4⅜—5⅛	..
50,000	10	Feb. 26	16⅔	15/-	Bournemouth Gas and Water — 10 p.c.	29—30	24—26	25⅞
388,110	10	,,	7	7/-	Bournemouth Gas and Water — B 7 p.c.	15—15¼	10⅜—11⅛	..
115,000	10	,,	6	6/-	Bournemouth Gas and Water — Pref. 6 p.c.	13¼—14	9⅛—9⅜	..
159,740	—	—	—	4%	Bournemouth Gas and Water — 4 p.c. Deb.	...	6⅝—71	..
992,045	Stk.	Feb. 26	14	5 1/16%	Brentford A Consolid.	261—266	79—83	80½
734,920	,,	,,	11	4⅛%	Do. B New	204—209	77—80	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	2⅜—3	..
100,000	10	—	—	4⅛%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4⅛%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79½—80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	72—74	..
560,000	,,	,,	5½	46/8	Do. 3½ p.c. do.	103—105	66—68	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	60—62	..
278,400	—	—	—	11⅛%	Croydon B and C 7 p.c.	...	170—180	..
—	—	—	—	10%	Do. E	...	...	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd.	17½—18	11—12*	11—11⅞
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas — 4 p.c. Ord.	98—102	67—69*	67—68½
2,600,000	,,	,,	3½	3⅛%	Gas — 3½ p.c. max.	76—79	54—56*	55—56
4,062,235	,,	,,	4	4%	Light and Coke — 4 p.c. Con. Pref.	96—99	70—72*	..
4,674,850	,,	June 11	3	3%	Light and Coke — 3 p.c. Con. Deb.	72½—74½	55—57	55½—56⅜
130,000	,,	,,	10	10%	Light and Coke — 10 p.c. Bonds	...	...	..
258,740	,,	Mar. 12	5	4⅛%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16⅛—16½	7⅞—8⅛	..
26,600	—	—	—	9⅛%	Hornsey 7 p.c.	...	120—130	..
131,000	Stk.	Mar. 12	7⅞	7⅛%	Ilford A and C.	151—154	95—100	..
65,780	,,	,,	6⅜	5⅝%	Do. B.	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	79—84	79—80½
1,235,000	,,	Feb. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6⅛%	Lea Bridge Ord. 5 p.c.	119—121	85½—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. — A	211—213	82—83	..
					Liverpool 5 p.c. Ord. — B	146—148		..
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3½—4*	..
250,000	100	April 1	4½	4½%	Met. of Melbourne — 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11⅛—12	8—8⅛	8 1/16—8½
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	68½—69½*	..
529,705	,,	June 26	3⅜	3⅜%	Do. 3½ p.c. Deb.	82—88	61—63	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7⅞	2—3	..
60,000	50	Feb. 26	13	12½%	Portsea, Island B	128—131	92—97	..
100,000	50	,,	12	11%	Do. C	118—121	85—90	..
52,000	50	,,	10	9%	Do. D	...	...	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅞—2⅛	36/—37/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	2⅜—3⅛	55/—56/3
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	...	...	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo — 6 p.c. Pref.	10⅜—11	7⅜—8⅛	..
125,000	50	July 1	5	5%	San Paulo — 5 p.c. Deb.	47—49	40—42	40⅝
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—234	...	..
209,984	,,	,,	10	10%	Do. B	223—234	180—184	..
523,500	,,	,,	10	10%	Do. C	220—222	...	..
90,000	10	May 28	9	6/-	South African.	10⅜—11⅞	8⅛—9⅛	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	73—75	..
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72⅛—74½	55—57	..
234,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
962,795	,,	,,	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	77—78
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	77—79	..
135,000	,,	—	—	48/4	Do. West Kent	...	...	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5%	Tottenham — A 5 p.c.	135—138	95—100	96½
782,275	,,	,,	6	3⅛%	Tottenham — B 3½ p.c.	115—117	68—73	..
181,255	,,	June 26	4	4%	Tottenham — 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c.	151—156	114—119	..
255,636	,,	,,	6⅝	65/-	Do. B 3½ p.c.	120—134	99—101	..
108,075	,,	,,	5/17/8	56/-	Do. C 3½ p.c.	110—115	86—91	..
352,000	,,	,,	6⅛	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	,,	,,	6⅝	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

Maidstone Gas Company.

At the annual meeting of the Company on Thursday, the Directors, in presenting the accounts for the year ended June 30, will report that, although the price of coal at the pit-head is governed by the Price of Coal Limitation Act, no attempt has been made to regulate freights. During the past trading year, these have shown a persistent advance; and the present position can only be described as acute. While the income from residuals continues satisfactory, it is impossible to meet the extra cost of coal from this source alone. In face of these facts, the Directors had no option but to increase the price of gas by 6d. per 1000 c.ft.—the increase to take effect after the readings of the meters for the June quarter. Sales of gas show an increase of 7 million c.ft., or 2·24 p.ct., over the preceding year. The accounts indicate that, after providing for all fixed charges (including £2000 depreciation in respect of stoves and fittings), and £800 to the renewal fund, there remains an available balance of £13,819; and the Directors recommend payment of a dividend at the rate of £5 3s. 6d. p.ct. less tax, for the half year to June 30; an interim dividend at the same rate having been paid in March. In November last, the Directors converted the reserve fund investment of £5660 in 2½ p.ct. Consols, at a cost of £79, into the same amount of 2½ p.ct. Metropolitan Consolidated Stock. This stock is redeemable at par any time after 1919, and not later than 1949, and under normal conditions should show a marked appreciation in value long before the latter date. Fifty-two of the Company's employees have joined the army or navy since the commencement of the war. Of these, the Directors regret that three have been killed and two are prisoners of war.

The Doncaster Town Council, in committee last week, after hearing a report by the Chairman of the Gas Committee as to the present position of the coal contracts and supplies, recommended that the Committee be authorized to purchase immediately a second-hand water-gas plant, now at Truro, at an estimated cost, inclusive of removal and re-erection, of £650.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 1.]

Nos. 10,526—10,897.

BARTLETT, H. A.—"Gas-producers, &c." No. 10,544.
BENNETT, S. J.—"Electrical appliance for igniting combustible gases." No. 10,664.
CAMPBELL, A.—"Gas-burners." No. 10,872.
CROSSLEY, Sir K. I.—"Horizontal gas-engines." No. 10,662.
CROSSLEY, Sir K. I.—"Vertical gas-engines." No. 10,663.
DUTT, P. K.—"Purification of commercial benzol, &c., from thiophene, &c." No. 10,786.
EAVES, E.—"Gasholders for compressed gases." No. 10,713.
ESPENHAHN, E. V.—Treatment of gases obtained from coal, &c." No. 10,703.
HAMER, J. D.—See Dutt. No. 10,786.
HEENAN & FROUDE.—"Treating and cooling air and gas." No. 10,860.
HOLOPHANE GLASS COMPANY and HOLOPHANE, LTD.—"Glassware for illuminating." Nos. 10,709, 10,710, 10,765, 10,766, 10,767, July 25 and 26.
MASSEY, T. H.—"Rotary compressors or pumps." No. 10,657.
PEARSON, A. G.—Water-heating and cooking apparatus for gas-stoves, &c." No. 10,849.
SEAL, S.—Gas-meters." No. 10,603.
SHAWCROSS, G. B.—See Eaves. No. 10,713.
TELEPHOS DOMESTIC AND STREET LIGHTING COMPANY.—"Operating electric switches from a distance." No. 10,817.
THEISEN, H. E.—Drying, purification, and cooling of gases, vapours, &c." No. 10,611.
TIPPER, G. E.—See Seal. No. 10,603.
WEBB, W. LE. P.—See Crossley. Nos. 10,662 and 10,663.
WILSON, W.—"Coke-discharger." No. 10,730.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

GAS MANAGER. Whitehaven Gas Company. Applications by Aug. 25.
CHEMIST. Stretford Gas Company.
LABORATORY ASSISTANT. Coventry Gas Department.
LABORATORY ASSISTANT (Industrial Appliance Manufacturers). No. 6332.
MECHANIC. Kettering Gas-Works.
WORKS FOREMAN. Walsall Gas Department. Applications by Aug. 18.
CLERK. Bridlington Gas-Works.
SKILLED LABOURER (Repairing Mains, &c). Chiltern Hills Spring Water Company, Aylesbury.
STOKER. Braintree Gas-Works.
STOKER. Farzeley Gas Company.
STOKERS. Milton Regis Gas-Works.

Tank Wagons for Hire.

PARTICULARS OF No. 6333.

Plant, &c., for Sale.

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Plant, &c., Wanted.

TANK WAGONS. No. 6330.

Patent Licences, &c.

GAS MANTLES. D. Young & Co., 11 and 12, Southampton Buildings, W.C. 2.

Meetings.

BARNET GAS AND WATER COMPANY. No. 139, Cannon Street, E.C. Aug. 29, 12.30 o'clock.
IRISH ASSOCIATION OF GAS MANAGERS. City Hall, Belfast. Aug. 14. 11.30 o'clock.
RIDDINGS GAS COMPANY. 139, Cannon Street, E.C., Aug. 28. 2.30 o'clock.

TENDERS FOR—

Coal.

ABERYSTWYTH GAS COMPANY. Tenders by Aug. 14.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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See illustrated Advertisement Feb. 20, p. III. of Centre.

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Apply to H. W. KAYE, Manager, Gas-Works, MILTON REGIS.

WANTED—A Capable All-Round, MECHANIC with knowledge of Fiddes-Aldridge Stoking Machine and Electrical Plant. Permanency to suitable man.
Apply, stating particulars of Age, Experience, and Wage required, to the MANAGER, Gas-Works, KETTERING.

STRETFORD GAS COMPANY.

CHEMIST Wanted, to Take Charge of Laboratory. Knowledge of Benzol Testing, Calorimetry, and General Gas-Works Analysis desirable.
Apply, by Aug. 8, giving Age, References, Experience, and Salary required, to H. KENDRICK, Engineer and Manager, Gas-Works, STRETFORD.

WANTED—A Clerk Experienced in Routine of Gas-Works Distribution Office (Ineligible).
Apply, with *Copies* of Testimonials, to the MANAGER, Gas-Works, BRIDLINGTON.

IRISH ASSOCIATION of GAS MANAGERS.

PRESIDENT:
A. S. BROOK, Lisburn.

THE
ANNUAL MEETING
Of the Association
WILL BE HELD IN THE
COUNCIL CHAMBERS, CITY HALL, BELFAST,
ON TUESDAY, AUG. 14, 1917.

The Chair will be taken at 11.30 a.m. by the PRESIDENT.

BUSINESS: Reception by the Lord Mayor of Belfast—Councillor James Johnston; President's Address; Report of Committee, with Abstract of Accounts and Auditor's Report; Election of Scrutineers; Election of District Representative on Council of Institution of Gas Engineers; Discussion on the Formation of a Commercial Section, introduced by Mr. Reid, Ballina.

PAPERS TO BE READ.

"Intermittent Vertical Retorts for Medium-Sized and Small Gas Undertakings," by F. G. Ambler.
"Exceptional Difficulties Experienced in Administration of the Mallow Gas Undertaking," by P. J. Philpott.

By invitation of the President, the members and their lady friends will partake of light refreshments in Ye Olde Castle Restaurant, about 1 o'clock p.m.

By permission of the Gas Committee and Mr. Smith, the Engineer and Manager, members will be allowed to visit the Belfast Corporation Gas-Works on Tuesday afternoon.

The usual Dinner of the Association will take place at 6 p.m., at Ye Olde Castle Restaurant. Members are requested to apply at once for tickets, as the number must be guaranteed by Aug. 9. Tickets 4s. each.

On Wednesday, Aug. 15, an Excursion for members and lady friends has been arranged as follows: Train leaves the Belfast and County Down Railway Station at 10.50 a.m., arriving at Newcastle at 12.5 p.m. Dinner will be served at the Mourne Hotel, Newcastle, at 1 2.30 p.m. Tea will be served at 4 o'clock, so as to facilitate passengers going back to Belfast by the 4.25 p.m. train, or South by the Great Northern 4.55 p.m. train. Prices of Tickets, including Railway, Dinner and Tea Fees and Gratuities, 10s. 6d. each. Tickets can be booked—outward journey by Belfast and Co. Down Railway, and return by Great Northern Railway to Belfast, or outward and return journey by Belfast and Co. Down Railway; but the route chosen must be specified in covering letter. No application can possibly be entertained after AUG. 9

G. AIRTH,
Hon. Secretary and Treasurer.
Gas-Works, Dundalk.

GAS Stoker Wanted, Shovel Charging. Wages, 7s. per Twelve-Hour Shift, and 10s. per Week War Bonus.
Apply to the MANAGER, Gas-Works, Braintree, ESSEX.

STOKER Wanted, Shovel Charging. Wages, 6s. per day. Time-and-half for Sundays. Holiday with pay.
Apply to Mr. F. L. WIELAND, Secretary, Fazeley Gas Company's Office, 22, Market Street, Tamworth.

ASSISTANT Required for the Laboratory of a firm of Industrial Appliance Manufacturers.
Apply, by letter, giving details as to Age, Experience, and Salary required, to No. 6332, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

CHILTERN HILLS SPRING WATER COMPANY, AYLESBURY.

WANTED. — Skilled Labourer for Repairing Mains, in Tring district, and to Assist in Repairs to Deep-Well Pumps, Cleaning out Boilers and Reservoirs; also Work General to Pumping-Station.
House, Garden, and Coal provided at Dancers End Station.
Applicants must state Wages required, together with Age and Qualifications, to H. A. CALLON, Manager.

COUNTY BOROUGH OF WALSALL.
(GAS DEPARTMENT.)

THE Gas Committee require, at once, a Competent WORKS FOREMAN—one Ineligible for the Army.
Application in own writing, stating Wages required, and enclosing Three Testimonials, addressed to the undersigned, and marked "Works Foreman," not later than the 18th inst. No House provided.

B. W. SMITH,
Engineer and Manager.
Gas-Works,
Pleck, Walsall,
Aug. 1, 1917.

COVENTRY CORPORATION.
(GAS DEPARTMENT.)

CHIEF Laboratory Assistant Wanted. Duties consist of General Gas-Works and Carburetted Water-Gas Plant routine, and Opportunities of Obtaining Experience in the Control of Benzol, Sulphuric Acid, and Other Bye-Product Plants. Previous Experience on a Gas-Works Essential.
Apply, stating Age, Experience, Qualifications, and Salary required, to

FLETCHER W. STEVENSON,
Engineer and General Manager.
Gas-Works, Coventry,
July 13, 1917.

WHITEHAVEN UNITED GAS COMPANY, LIMITED.

THE above Company invite Applications for a PRACTICAL GAS MANAGER Annual make, about 40 Millions. Candidates must have Experience in Sulphate of Ammonia Manufacture and Carbonizing Methods.
Applications, in writing, stating Age, Qualifications, Experience, and Salary expected, with *Copies* of Two recent Testimonials, to be sent to the undersigned, not later than Aug. 25, 1917.

J. H. STUDHOLME,
Secretary.
67, Lowther Street,
Whitehaven.

FOR HIRE. — Ten Clean Railway TANK WAGONS. Capacity ,about 2500 gallons. Immediate delivery.
Address No. 6333, care of MR KING, 11, Bolt Court, FLEET STREET, E.C. 4.

FOR Sale. — Two Sets of Bryan-Donkin Twin EXHAUSTERS and STEAM-ENGINES, of 40,000 cubic feet per hour, with 12-in. and 6-in. Connections and Valves, Steam Regulator, &c. In good order.
F. J. BANCROFT, Gas-Works, NEW BARNET.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

GASHOLDERS and Other Plant Wanted, either for Re-use or Scrapping. Dismantling Specialists.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, LEEDS.

TANK WAGONS.—Wanted to Purchase, suitable for Tar and Gas Liquor Traffic.
Address No. 6330, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

ABERYSTWYTH GAS COMPANY.

THE Directors invite Tenders for the Supply of 5500 Tons of SCREENED GAS COAL, COBBLES, or NUTS, covering Twelve Months, delivered at Aberystwyth Station.
Tenders, with Analysis, to be Delivered on or before the 14th day of August, 1917.
Further Particulars can be obtained from the Undersigned.

J. GAUNT,
Engineer and Manager.
Gas Offices, Aberystwyth.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Offices of the Company, 139, Cannon Street, London, E.C., on Wednesday, the 29th day of August, 1917, at half-past twelve o'clock precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th of June last; to declare a Dividend; and to transact the General Business of the Company.
The TRANSFER BOOK WILL BE CLOSED from the 16th to the 29th of August, both inclusive.
By order of the Board,

ERNEST W. DREW,
Secretary.
Offices:
139, Cannon Street, London,
Aug. 2, 1917.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Proprietors of the above Company will be held at the Offices of the Company, No. 139, Cannon Street, in the City of London, on Tuesday, the 28th day of August, 1917, at Half-past Two o'clock in the afternoon, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last; to declare a Dividend; and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 15th to the 28th inst., both inclusive.
By order of the Board,

ERNEST W. DREW,
Secretary.
Offices: 139, Cannon Street,
London, Aug. 3, 1917.

THE Proprietors of British Patents Nos. 25,516 of 1906, 25,588 of 1906, 11,152 of 1908, 28,943 of 1910, 4763 of 1912, 4772 of 1912, 8429 of 1912, 20,291 of 1912, and 11,591 of 1914, relating to the MANUFACTURE OF INCANDESCENT GAS-MANTLES," desire to enter into Negotiations with one or more Firms in Great Britain for the SALE of the PATENT RIGHTS or for the grant of LICENCES to Manufacture under Royalty.
Inquiries to be addressed to D. YOUNG & CO., Patent Agents, 11 & 12, Southampton Buildings, London, W.C. 2.